International Hellenic University

School of Economics and Business Administration

M.Sc. in Banking and Finance 2012-2013

Stock Splits: Evidence from the German Stock Exchange

Students: Apostolos Anemoudis
Dimitrios Mousmoulas

ID Numbers: 1103120001
1103110021

November 2013

Abstract

Although stock splits seem to be a purely cosmetic event, there exists ample empirical evidence from the different capital markets all around the world that stock splits are associated with abnormal returns on the announcement day. This dissertation employs a sample of German companies that announced a stock split during the years 2008 and 2009, a period which signals the beginning of the economic crisis. The main objective the current study assesses is the impact of stock split announcements on stock prices. The results are not consistent with the findings in other capital markets, including the U.S., as no evidence of positive price reaction is observed around the announcement day of German stock splits. Institutional differences between Germany and other capital markets allow the examination of one of the main hypothesis on the announcement effect, which is the signaling hypothesis. We argue that legal restrictions strongly limit the ability of German companies to use a stock split for signaling and that stock price reactions are not related to future earnings.

Acknowledgements

We would like to express our sincere gratitude to Dr. Apostolos Dasilas for his valuable guidance and suggestions during all stages of this dissertation, from the data collection and planning to the writing up and revision of this dissertation. Moreover, we would like to thank our family and friends for supporting and encouraging us patiently all this time.

“To my family & my fiancée”
Dimitris

“To my family & Zoi”
Apostolos

Table of Contents

Chapter 1

Introduction

"A stock split is a corporate decision which increases the number of equity shares outstanding of a firm. Existing shareholders exchange their old shares for stocks with a lower par value without additional cash outlays. As stock splits do not affect the real activities or the financial structure of the firm, under certain assumptions, they are considered theoretically as irrelevant decisions" (Yagüe et al., 2009). Despite their apparent innocuousness, it is well documented that split announcements provoke a positive reaction in share prices. There exists ample empirical evidence that in the U.S. stock splits are associated with positive abnormal returns around the announcement and the execution day and in addition to an increase in variance following the ex-split day. Despite the lack of any direct effects on the operational and financial structure of a firm, studies have shown that stock splits are not purely cosmetic events, but have a positive impact on share prices. "In fact, since Fama, Fisher, Jensen and Roll (1969) published their seminal paper on stock splits, a large body of research has investigated this particular corporate decision. The interest in stock splits is motivated by the fact that this event is not directly related to changes in the operating or financial structure of the firm and, therefore, should cause no change in stock price other than the adjustment warranted by the split factor" (Leledakis et al., 2009).

Following the publication of the aforementioned study, several hypotheses have been put forward to explain the market reaction around the announcement day and extensive research has provided empirical support for various explanations. The most favored were the optimal trading range hypothesis tested by Lakonishok and Lev (1987), McNichols and Dravid (1990), the "attention-gathering" hypothesis tested by Grinblatt (1984) and the signaling hypothesis tested by Brennan and Copeland (1988) and McNichols and Dravid (1990). Signaling hypothesis offers one of the most plausible explanations for this market reaction and claims that managers use stock split announcements to convey private information to the market. "The finance literature considers them to be positive signals, although there are certain discrepancies over whether stock splits signal future earnings increases or whether the good pre-split earnings performance is permanent" (Yagüe et al., 2009). On the other hand, there is no

evidence of improved liquidity following stock splits as reported by Copeland (1979), Lakonishok and Lev (1987) and Conroy (1990). "In addition, several studies found that the neglected firm hypothesis, which was considered by Grinblatt, Masulis, and Titman (1984), Arbel and Swanson (1993), and Rankine and Stice (1997) provided some explanation power as well" (Wulff, 2002). Evidence of significant positive abnormal returns associated with stock splits has also been reported for markets outside the U.S. Some important examples are included in the studies of Kryzanowski and Zhang (1991) for Canadian stocks, Baixauli for Spain (2007) and Bechmann's and Raaballe's for Denmark (2007).

This study analyzes the price effects of stock splits undertaken by firms whose stock is traded on the Frankfurt Stock Exchange (FSE) during the years 2008 and 2009. The selection of the examined period is not arbitrary and it is chosen in order to consider the price effects of stock splits during the outbreak of the global economic crisis. It also tests empirically one of the hypotheses that have been advanced by prior literature to explain the abnormal price reaction to stock splits. In this study, the findings come from an important international stock market with rules and institutional characteristics different from those of U.S. markets. Also, due to institutional differences between Germany and U.S. not all of the existing theories seem plausible for the German case, thus leading to further insights into the explanation power of the competing theories. Moreover, "stock splits in Germany seem to have a political argument attached to them as well: a broad shareholder base is desirable because the more individuals own shares the greater the society's acceptance of economic policies promoting the free market. As of today, only a low percentage of the German population, which still favors savings accounts and treasury securities, invests in equities" (Bley, 2002).

In contrast to U.S. stock splits and not in line with the results of many other studies on stock splits in different capital markets, no evidence of significant positive reaction around the stock split announcement day is found for stock splits undertaken during the years 2008 and 2009 in the Frankfurt Stock Exchange (FSE). Further empirical tests suggest that there is no evidence that market price reaction reflect the German firm's private expectation about future earnings.

This dissertation contributes to the existing literature, as it tries to extend the international empirical evidence on stock splits to the German capital market in a very specific and important time period, which marks the beginning of the global economic crisis. The global credit crunch has affected negatively the stock prices and the

fundamentals of German firms and as a consequence, it is supposed that contrary to previous literature no abnormal returns or signaling effects are expected following stock splits announcements during the years 2008 and 2009. The outline of the dissertation is as follows. In Chapter 2 the pertinent literature on stock splits is reviewed, while in Chapter 3 the institutional differences between German and U.S. stock splits are explained. Their implications to the applicability of the existing theories to the German case are analyzed in Chapter 4, which also describes the data and the sample. Chapter 6 explains the methodology, while Chapter 7 presents and interprets the empirical results. Finally, Chapter 8 summarizes and concludes the dissertation.

Chapter 2

Literature review

"The efficient market conception of near-perfect capital markets that render only fleeting and nonsystematic gain and loss opportunities to investors has been criticized in recent years by the behavioral finance literature, which offers evidence that stock transactions are often executed (in relation to known events such as stock issues, stock splits, and repurchases) at price levels that imply predictably high or low risk-adjusted returns" (Byun & Rozeff, 2003). "If these findings are factually correct, they pose a challenge to the efficient market hypothesis, which predicts a lack of capital market profit and loss opportunities due to the abilities of investors rapidly and impartially to interpret information according to correct assessments of the underlying economic processes" (Dhar & Chhaochharia, 2009).

A stock split is a corporate decision which increases the number of equity shares outstanding of a firm. "Existing shareholders exchange their old shares for stocks with a lower par value without additional cash outlays. As stock splits do not affect the real activities or the financial structure of the firm, under certain assumptions, they are considered theoretically as irrelevant decisions. As a result, by assuming efficient capital markets, splits should be without consequences for the price of a company's stocks" (Yagüe et al., 2009). "By splitting, the invested capital is simply spread over a larger number of stocks with accordingly smaller values. Since splits are "just a finer slicing of a given cake", as reported by Lakonishok and Lev (1987), that do not alter the future cash flows of a company, one would expect that stock prices would not react to the announcement and execution of stock splits. This raises the question of why companies consider splitting their stock. If there are no gains to be expected from splitting a company's stock, and the company must bear transaction costs (bank commissions, expenses for printing publications, etc.), it does not make much sense to carry out such operations. However, since companies do initiate stock splits, a company must expect to gain something (Kunz & Rosa-Majhensek, 2008).

Many studies on the U.S. stock splits such those of Grinblatt, Masulis and Titman (1984), Lamoureux and Poon (1987), McNichols and Dravid (1990), Maloney

and Mulherin (1992) and Ikenberry, Rankine and Stice (1996) have concluded that there is evidence of significant positive abnormal returns around the split announcement day. In particular, "Grinblatt, Masulis, and Titman (1984) found that, in the period from 1967 to 1976, their sample of stocks realized an excess return of 3.44% during the three days (-1, 0, +1) surrounding stock split announcements. Ikenberry, Rankine, and Stice (1996) examined 1,275 two-for-one stock splits announced by NYSE and Amex firms from 1975 through 1990 and observed excess returns of 7.93% in the first year after a stock split and 12.15% in the first three years following a split. These gains were preceded by excess returns of 3.38% on the announcement date" (Kunz & Rosa-Majhensek, 2008). Grinblatt et al. (1984) have also observed that "the positive stock price reaction on the announcement day follows a significant positive price run-up in the months preceding the stock split decision. Ikenberry, Rankine and Stice (1996) proved that this price run-up is followed by a persistent upward price drift, which they attributed to investors' underreaction at the announcement time" (Leledakis et al., 2009). Moreover, evidence of significant positive abnormal price reaction was also found around the ex-day of the splits. This was observed by many researchers, such as Eades, Hess and Kim (1984), Grinblatt, Masulis and Titman (1984), Lamoureux and Poon (1987) and Maloney and Mulherin (1992). "Lamoureux and Poon (1987) attributed the positive market reaction to price pressure induced by an expansion of the investor clientele of the splitting stocks which generates additional positive revaluation around the ex-day, while Maloney and Mulherin (1992) provided evidence that the ex-day positive price reaction was a result of a temporary order imbalance caused by a surge of buy orders as new investors are attracted to the splitting stock" (Leledakis et al, 2009).

Furthermore, "significant positive abnormal returns around the announcement and ex-day of splitting stocks have been also reported from markets outside the U.S. There are many examples in line with the above finding from different studies such as those of Kryzanowski and Hao (1991) for stock splits in Canadian market, Biger and Page (1992) for splits from the Johannesburg Stock Exchange, Wu and Chan (1997) for Hong Kong stocks, Niini (2000) for stocks in Finland and Sweden, Bechmann and Raaballe (2004) for Danish stocks (2004) and Wulff (2002) for splits on the German Stock Exchange" (Mishra, 2007). In particular, Wu and Chan (1997) found excess returns on the Hong Kong stock exchange. They examined 67 splits in the period from 1986 to 1992 and observed that the excess return over the three days surrounding a split announcement amounted to an astounding 18.2%. Similar observations were made on

the German stock exchange by Wulff (2002) who reported excess returns during the four days following stock split announcements as well as during the four days after the effective date. The respective profits, however, were much lower than those seen in the United States. Moreover Bechmann and Raaballe (2004) reported a positive and significant announcement effect of 2.5% for Danish stock splits. They explained this announcement effect as a consequence of an increased payout of the splitting companies (Kunz & Rosa-Majhensek, 2008).

There are several theories advanced as explanations for why companies split their stock. However, the three most common are valuation effects generated by changes in liquidity and trading costs, the adjustment of price to an optimal trading range, and signaling which were used by many researchers in order to find an explanation for the market's positive response to stock splits. Firstly, "the liquidity-improvement hypothesis is based on the premise that lower-priced stocks draw more investors and generate higher trading volume, which result to enhance the marketability and reduce the bid-ask spread" (Leledakis et al, 2009). "Some support for the liquidity effect is found in Muscarella and Vetsuypens (1996) and Schultz (2000), who found that the frequency and volume of small trades increase following a stock split" (Dennis, 2003). However, "the overall evidence does not seem to support the liquidity improvement hypothesis, as Copeland (1979) found a widening and not a reduction of the bid-ask spread as percent of price following stock splits". Conroy, Harris and Benet (1990), Schultz (2000) and Easley, O'Hara and Saar (2001) have also reported similar results about the bid-ask spread in the post-split period (Leledakis et al., 2009). Results consistent with the above were also reported by Lakonishok and Lev (1987), who found that the announcement of a split generates a substantial increase in trading activity that vanishes by the second month following the split announcement (Lakonishok & Lev, 1987) and Lamoureux and Poon (1987) and Conroy, Harris and Benet (1990) who found a decrease or no change in the trading volume of splitting stocks (Leledakis et al., 2009). "Bley (2002) examined 40 stock splits in the German stock market from 1994 to 1996. To avoid any size effects, he divided the sample companies into two groups according to their market capitalization and found that, after stock splits, daily trading volume decreased significantly for the class of high-market-capitalization stocks. In contrast to these findings, Wulff (2002) reported considerable increases in trading volume subsequent to stock splits in Germany" (Kunz & Rosa-Majhensek, 2008). Finally, lack of evidence for

the liquidity hypothesis is also reported in Bechmann and Raaballe (2007) for Danish stocks.

As for the trading range hypothesis, which states that "the adjustment of the price back to its optimal trading range can result in a positive revaluation effect, the main argument behind it is the preference of small investors to have low-price stocks in order to trade in round many of them and minimize their trading costs. On the other hand, large investors prefer high-price stocks since the trading cost per unit of money falls as the price moves higher, thus, leaving the optimal trading range effect open to empirical validation. Similarly, firms may use a split to achieve an optimal balance of investor clienteles resulting in a better valuation of their stock" (Leledakis et al., 2009). Early studies by Myers and Bakay (1948), Barker (1956), and Johnson (1966) report positive stock price appreciation net of market price indexes in the period preceding the split. In later studies including those of Lakonishok and Lev (1987), Ikenberry, Rankine and Stice (1996) and Rozeff (1998) it was proved that stock prices increase faster for firms that later split their stock than for firms that actually not. "Assuming that a lower stock price would be more attractive to retail investors, managers might use a split to extend the shareholder base as reported by Lamoureux and Poon (1987). In his paper, Schultz (2000) analyzed 235 NASDAQ and NYSE/Amex stocks, confirmed that there is a substantial increase in small orders following stock splits and that a vast majority of these are buy orders. These findings are consistent with the notion that the shareholder base is increased in the wake of a split" (Kunz & Rosa-Majhensek, 2008). While Lakonishok and Lev (1987) concluded that splits might affect the composition of shareholders, in form of a shift from institutional to individual investors, Szewczyk and Tsetsekos (1995) reported that institutional ownership increases after a split (Bley, 2002). Similarly, Angel et al. (2004) find increased trading activity by retail shareholders after the split. According to their results, "activity by small-size shareholders doubled over a 40-day period following a split, whereas large-volume traders considerably lowered their engagement. In this context, it is often argued that companies gain flexibility by splitting their stocks. For example, many companies seek to reward and motivate their employees with stocks in the company. However, if one share costs quite a lot, it would be difficult to make appropriately sized awards to employees who make only modest contributions to profitability. Lower stock prices allow companies to reward and motivate all their employees with stocks" (Kunz & Rosa-Majhensek, 2008). "Other studies, such as those of Harris and Benet (1990),

McNichols and Dravid (1990) and Rozeff (1998) found that stock splits follow stock price run-ups that push stock prices above the normal range for peer groups. Hence, stock split factors are found to correlate with pre-split prices and deviations from the perceived normal price range" (Leledakis et al., 2009). Furthermore, results reported in the studies of Easley, O'Hara and Saar (2001) based on the modeling of trades "also provided strong support for the trading range hypothesis. On the basis of a market microstructure sequential trade model, they concluded that trading activity of uninformed market participants increased following stock splits. Moreover, they reported a slight shift by uninformed traders (so-called "noise traders") toward market-order trades. As they asserted, these results are consistent with an extension of the shareholder base. Simultaneously, however, they found that informed trading also increased" (Kunz & Rosa-Majhensek, 2008).

Finally, according to the signaling hypothesis, "splits are means of conveying information from managers to stockholders. By announcing a stock split, a company can reduce information asymmetries that might exist between stockholders and management. The stock price reduction resulting from a stock split conveys management's conviction of rising future earnings as supported by Fame, Fisher, Jensen, and Roll (1969)" (Kunz & Rosa-Majhensek, 2008). Generally, "while the empirical evidence regarding the signaling hypothesis is mixed, there is more evidence in favor of the signaling hypothesis than against it. Several studies find evidence in favor of a signaling explanation" (Dennis, 2003). "Stock splits can be informative to the market in two ways, as they can both be used to signal the firm's private information about future and help attracting the interest of more analysts and investors and thus lead to a positive revaluation of the stock. Stock splits can have signaling value because they have costly consequences, including execution costs, higher listing fees, and greater trading costs associated with price drops, as reported by Brennan and Copeland (1988), and as a result only firms with positive private information can afford to signal through a stock split" (Leledakis et al., 2009). "Brennan and Copeland (1988) also pointed out that a split imposes costs on current shareholders of the firm. Since each old share is not replaced with an integral number of new shares, investors who previously owned round lots find themselves with more expense to sell odd lots. Contrary to that Lamoureux and Poon (1987) argued that no such costs exist and, thus, a split could even be interpreted as a negative signal, which means that the management feels its stock price has peaked. While Eades (1984) supported the notion of increased transaction costs, and Copeland

(1979) and Branch (1985) showed transaction costs to be an inverse function of stock price, the case for costly signaling by stock splits remains unclear" (Bley, 2002). "Grinblatt et al. (1984) also remarked that competitors do not get access to information and management will not be held responsible for making false promises about future prospects when simply splitting their company's stock. They also stress that, because of a split, a firm will be able to attract increasing attention from the media and investors, which is believed to boost its stock price" (Kunz & Rosa-Majhensek, 2008). Firms can split their stock in order to attract market attention as Grinblatt, Masulis and Titman (1984) and Brennan and Hughes (1991) reported (Leledakis et al., 2009). "Because institutional investors tend to ignore small firms, less information is generally available on small firms. Therefore, the additional information generated by a stock split is much more valuable to small firms than it is to large ones, about which information is usually abundant" (Kunz & Rosa-Majhensek, 2008). However, there is also evidence that seems to refute the signaling explanation as "Muscarella and Vetsuypens (1996) examined cases in which American Depository Receipts (ADRs) split in the United States, but the home-country stock underlying the ADR did not. They had two observations that contradict the signaling hypothesis. While they argued that if a firm wanted to signal good news, it would split the home-country stock as well as the ADR, on the other hand, they did not find above-average post-split earnings changes in firms that split their ADRs" (Dennis, 2003). From the above, it can be concluded that "only firms that believe to be undervalued or expect to perform well in the future have the incentive to attract attention and cause a revaluation of their fundamentals. Both these information-based theories have received supportive evidence in the U.S., as for example, Lakonishok and Lev (1987) found that, compared to their peers, splitting firms have strong pre-split earnings performance which is not reversed after the split. These findings were also supported by evidence in several other studies, such in those of McNichols and Dravid (1990), Crawford (2005). In addition, the self-selection hypothesis of Ikenberry (1996) suggests that the preference for a trading range generates a signaling effect associated with the post-split target price. If firms wish to keep their share price above a floor level, they will choose a lower post-split target price the more optimistic they are about their future share prices. The empirical evidence of an inverse relationship between post-split target prices and the market reaction to stock splits is consistent with this hypothesis. Last but not least McNichols and Dravid (1990) not only reported in their studies that unanticipated earnings per share (EPS) increase after the

split, but also that split factors are positively related to favorable post-split earnings surprises and that the announcement excess returns increase with the split factor (Leledakis et al., 2009), while "the difference between actual and forecasted earnings following a split tends to be directly related to the size of the split factor: the higher the split factor, the better the earnings" (Dennis, 2003).

Chapter 3

German Stock split Mechanisms and Empirical Implications[1]

"In the U.S., as in Germany, stock splits increase the number of shares without leading to an inflow or outflow of cash, without changing the investment opportunities of the corporation, or even without changing its book value. The increase in the number of shares is done by reducing the par value of the share accordingly. The main difference between stock splits in Germany and the U.S. is largely in the fundamental role of the par value of German stocks. Most stocks issued by a U.S. corporation have a par value, but they do not need to have one. Usually the par value of a U.S. company is very low and its main privilege is that it does not prevent the company from deciding on a stock split or choosing a convenient split factor. The scope for German companies to split their stock is limited by the minimum par value requirement of the German corporate code (§ 8 Aktiengesetz)", which states that par value shares must be denominated in Euros at least 1 and that higher nominal share amounts must be expressed in Euros. "Once a company's stock is traded at the minimum par value, no further splits are possible. In 1994 the minimum par value was lowered from 50 DM to 5 DM, triggering a wave of stock splits. A similar wave of stock splits had occurred when in 1966 the minimum par value was lowered from 100 DM to 50 DM."

Furthermore, "only certain other par values were allowed above the minimum par value, while before 1994, the range of possible higher par values was restricted to multiples of 100 DM and in 1994 it changed to multiples of the new minimum par value of 5 DM. In the years before each corporate law reform act, almost all stocks were traded at the prevailing minimum par value and although after the corporate code reform act of 1994 companies could have decided on a new par value below 50 DM but above 5 DM such as 10 DM or 15 DM, none has chosen to do so and all have split their stock to the lowest possible par value of 5 DM. In 1994, the number of stock splits increased immediately after the change in legislation."

Moreover, "both in the U.S. and Germany, stock dividends differ from stock splits in their accounting treatment. A stock split increases the number of shares by

[1] Wulff, C. (2002). The Market Reaction to Stock Splits - Evidence from Germany. Schmalenbach Business Review, Vol. 54, 270 – 297.

reducing the par value accordingly, while a stock dividend requires a transfer from retained earnings. Thus, unlike a stock split, a stock dividend can reduce the financial flexibility of a firm. This loss of flexibility can be interpreted as a cost of signaling and means that the signaling content of a stock dividend announcement should be much higher than that of a split announcement. However, in the U.S., many empirical studies including those of Grinblatt, Masulis and Titman (1984) and Lakonishok and Lev (1987), have used the CRSP classification or the split factor instead of the actual accounting treatment to distinguish between stock splits and stock dividends. Other studies, including that of McNichols and Dravid (1990) do not distinguish between stock splits and stock dividends at all. Rankine and Stice (1997) showed that the CRSP classification of stock splits and stock dividends matches the actual accounting treatment in only 23% of the events in their sample. As they reported an abnormal return of 0.53% for stock splits in a three-day announcement period, compared to 2.24% for stock dividends, they show that a careful distinction between both events is crucial for assessing potential information contents.

In Germany, the distinction between these two corporate events is clear cut. Since the minimum par value rule does not apply to German stock dividends, they occur regularly throughout the years. Also, the split factor of German stock dividends can be chosen according to the company's level of retained earnings. Because both corporate events must be approved by the annual general meeting, it happens that the same meeting decides on a stock dividend and a stock split, as both events are not mutually exclusive in Germany, but can occur simultaneously. Gebhardt, Entrup and Heiden (1994) and Padberg (1995) found that the announcement and the execution of German stock dividends are both associated with similar significant positive abnormal returns, as it is in the U.S. To date, there has been little empirical evidence on German stock splits. Both Wulff (1996) and Kaserer and Mohl (1998) examined stock splits for the period 1994-1995 and found cumulative abnormal returns of about 1% in a three-day announcement period from t(0) to t(+2). For larger event windows, Wulff (1996) reported positive, even though small, cumulative abnormal returns, but Kaserer and Mohl (1998) observed a reversal of the positive announcement effect by negative abnormal returns in surrounding days. Wulff (1996) reported an ex-day effect, while Kaserer and Mohl (1998) provided mixed evidence. They found a cumulative abnormal return of −0.19% for the event window [0; + 5] which contrasts with the positive cumulative returns of 1.11% and 1.18% in the event windows [−5; 0] and [−5; +5],

respectively. Nevertheless, due to the small sample size, the results of both papers must be treated with caution. In addition, Harrison (2000) used a much larger sample of German stock splits that covered the period from 1974 to 1997, but investigated only the ex-date effects of German stock splits. He found positive abnormal returns of 1.32% in the event window from t (−1) to t (+1) around the ex-day. However, by starting the observation period in 1974, Harrison omitted the cluster of stock split events around 1969." (Wulff, 2002)

The current study examines the announcement effect around the German stock splits by using three samples of stock splits initiated by German quoted firms between 2008 and 2009.

Chapter 4

Hypothesis, Sample & Data

4.1 Hypothesis

The most popular hypothesis used by researchers in order to construe the announcement effects around stock splits is the signaling hypothesis and that's the reason why we use it as a testable hypothesis. "The signaling hypothesis proposes that firms with favorable future prospects use stock splits to transmit information to market investors (Brennan and Copeland, 1988). The empirical evidence for the signaling hypothesis is mixed as in its favor stock splits are associated with information about future earnings (Pilotte, 1997), with increased earnings forecasts, (Conroy and Harris, 1999) and with reduced asymmetric information (Doran, 1994). Conversely, other studies conclude that stock split announcements do not convey information on future firm earnings (Asquith, 1989 Huang, 2006). The cost of the signal is the increase in the costs associated with the split including the increased fees paid to the exchange for trading a greater number of shares and the higher transaction costs due to the lower post-split stock price" (Yagüe et al., 2009). In their studies, "Grinblatt et al. (1984), Asquith, Healy and Palepu (1989), and Rankine and Stice (1997) hypothesized that firms signal information about their future earnings through their split announcement decision" (Wulff, 2002).

The managements' scope to decide on a stock split in Germany is limited by regulatory constraints, which implies that there can be no signaling content in the choice of the split factor as McNichols and Dravid (1990) found for the U.S., since in Germany the split factor is largely determined by the prevailing minimum par value. Unlike stock dividends, stock splits are not associated with a reduction in retained earnings, which could otherwise act as signaling costs, as suggested by Grinblatt, Masulis, and Titman (1984). Moreover, the signaling models of Brennan and Copeland (1988) and Brennan and Hughes (1991) cannot be applied to the German case, as they are both based on a specific brokerage cost schedules which are different in Germany vis-à-vis the U.S. As a result the market reaction to German stock splits should be considerably lower, if it is supposed that signaling is the main driving force behind the

announcement effect to stock splits and stock dividends in the U.S." (Wulff, 2002).

4.2 Sample and Data

The initial sample consists of all stock splits by firms listed on the official market segment of the Frankfurt Stock Exchange (FSE) from 2008 to 2009. There were a total of 237 stock splits (see Table A1 in the Appendix) in the German stock exchange over this period. To avoid the computation of returns from a small number of transaction days, sample firms with fewer than 100 trading days in the estimation period, that is, day -250 to day -11 relative to the event date, are excluded from the sample. This criterion resulted in a final sample of 194 stock splits for the price reaction tests around the announcement day. This sample is referred to throughout this study as "full" sample. Thirty-four cases were deleted from the "full" sample because their announcement day coincided with the announcement day of another corporate event of the same stock, such as a stock dividend or a rights issue, thus, leaving a sample of 160 stock splits. This sample is referred to throughout this study as "pure" sample. Moreover, the 34 cases, which were deleted from "full" sample, constitute the last sample taken under consideration and is referred as "contaminated" sample. Each one of the "full" and the "pure" samples are divided into two sub-samples based on the size of the split factors. As the median of the split factors is 3, stock splits with a split factor greater or equal to 3 are included in the one sub-sample, while stock splits with a split factor smaller than 3 are included in the other sub-sample.

Announcement dates of the stock splits, daily closing stock prices, daily stock index prices, split factors and all other accounting information were extracted from the Bloomberg International database. The announcement date is defined as the day when the first public announcement of the stock split is made and it coincides with the day of the board's press release that includes its stock split proposal. As a result, day 0 is presumed to be the date on which the market becomes aware of the firm's intention to expand the number of shares. However, information may be known to the market before trading closed on the previous day and, therefore, could influence stock prices. The announcement and effective dates for the companies in the samples under investigation are given in the Appendix Table A1. The daily stock prices obtained from the Bloomberg database are used to calculate daily stock returns as the natural logarithm of the quotient between the closing prices of two consecutive days. The daily returns series of the DAX index is used as a proxy for market return. Information whether a quoted

price was accompanied by a transaction or not is available for all splits of the "full" sample, but for only few splits detailed data about trading volume could be obtained and as a result are not taken into consideration.

Tables 1, 2 and 3 present the annual number of stock splits and the distribution of stock splits by split factor in the period 2008-2009 for each of the three samples taken into consideration. Stock splits appear to be not frequent corporate event in 2009, as only 60 of the total 194 stock splits declared between 2008 and 2009 occurred in 2009, while the rest occurred in 2008. During 2008 the DAX index dropped from 7,323.65 in January 2008 to 4,657.87 in December 2008 before rising to 5,836.65 in December 2009. Seemingly, stock splits are not driven by extraordinary stock price increases that push stock prices considerably above their normal trading range. The fact, however, that not all firms undertake stock splits under such market conditions suggests the possible presence of self-selection bias on firm characteristics. Nearly one third of the stock split factors are two-for-one (2:1), in each of the three samples, while only a low percentage of the split factors are below 2, which implies that stock splits undertaken by German firms reduce their stock prices substantially. Finally, this size distribution is very different to that of the U.S. market, "where half of all split factors are below 2 as reported by Ikenberry and Ramnath (2002)" (Yagüe et al., 2009).

Table 1: Annual distribution of stock splits of firms listed on the Frankfurt Stock Exchange and distribution of stock splits by split factor ("Full" sample).

Period 2008-2009.

Year	Number of Splits	Split Factor	Percent (%)
2008	134	> 5 for 1	22.7%
2009	60	5 for 1	10.8%
Total	194	4 for 1	9.3%
		3 for 1	10.8%
		2.5 for 1	0.5%
		2.25 for 1	0.5%
		2 for 1	32.0%
		< 2 for 1	13.4%
			100.0%

Table 2: Annual distribution of stock splits of firms listed on the Frankfurt Stock Exchange and distribution of stock splits by split factor ("Pure" sample).

Period 2008-2009.

Year	Number of Splits	Split Factor	Percent (%)
2008	107	> 5 for 1	23.1%
2009	53	5 for 1	11.9%
Total	160	4 for 1	10.0%
		3 for 1	11.3%
		2.5 for 1	0.6%
		2.25 for 1	0.6%
		2 for 1	31.3%
		< 2 for 1	11.3%
			100.0%

Table 3: Annual distribution of stock splits of firms listed on the Frankfurt Stock Exchange and distribution of stock splits by split factor ("Contaminated" sample).

Period 2008-2009.

Year	Number of Splits	Split Factor	Percent (%)
2008	27	> 5 for 1	20.6%
2009	7	5 for 1	5.9%
Total	34	4 for 1	5.9%
		3 for 1	8.8%
		2,5 for 1	0.0%
		2,25 for 1	0.0%
		2 for 1	35.3%
		< 2 for 1	23.5%
			100.0%

Chapter 5

Methodology

The price reaction to German stock splits is examined by applying the standard event study methodology as described in Brown and Warner (1985). This is the most common method that researchers use in order to examine market efficiency and to uncover wealth effects surrounding announcements of corporate events. Specifically, the current study examines whether the announcement of a stock split affects stock prices and consequently creates value for the company's shareholders. Market model and market adjusted model, which are return-generating models, are used.

According to the market model, the expected daily return for stock i in time t is given by equation (1), while for the market-adjusted model, which states that the ex-ante expected return on a stock is constant across stocks and can differ across time, is given by equation (2):

$$E(R_{i,t}) = \hat{\alpha} + \hat{\beta} * R_{m,t} \quad (1)$$

$$E(R_{i,t}) = E(R_{m,t}) \quad (2)$$

where $E(R_{i,t})$ denotes the return on security i at day t, $E(R_{m,t})$ is the return on the DAX index, which is the composite index of the FSE and is used as the proxy for the market portfolio, $\hat{a}_i$ and $\hat{\beta}_i$ are ordinary least square estimates of the intercept and slope, respectively, of the market model regression and are estimated using the corresponding market return, which is calculated using the DAX index. Denoting the event date as day 0, which is the announcement date in this case, regression coefficients are estimated over a period of 240 days from day -250 to day -11. Abnormal return is denoted as the difference between the actual return and the expected return on the security. Consequently, the calculation of the abnormal returns based on the market model and the market adjusted model is given by equation (3) and (4), respectively:

$$AR_{i,t} = R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i * R_{m,t} \quad (3)$$

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (4)$$

where $AR_{i,t}$ is the abnormal return for firm i at day t, $R_{i,t}$ is the return on security i at day t, $R_{m,t}$ is the return on the DAX index for German stocks, which is the composite index of the FSE and is used as the proxy for the market portfolio and $\hat{a}_i$ and $\hat{\beta}_i$ are the OLS estimates from the market model regression.

Equations (3) and (4) are used to calculate the abnormal returns of one security. We trim all abnormal returns of the samples by excluding 0.025% of data points from the top and bottom tails of the data set in order to exclude from the analysis outliers in the data. We compute Average Abnormal Returns (AARs) using both the Market model and the Market adjusted model, respectively as follows.

$$AAR_t = \sum_{i=1}^{N} \frac{AR_{i,t}}{N} \quad (5)$$

where N is the number of stocks that announced a split. In addition to the calculation of the abnormal returns based on the two models, the cumulative abnormal returns, which are the sum of the abnormal returns for a specific period T (from day i to day j), are also calculated. The formula used to calculate the cumulative abnormal returns is presented below in equation (6).

$$CAR_T = \sum_{t=i}^{j} AR_t \quad (6)$$

Cumulative abnormal returns (CARs) are computed for the following event windows (-10, +10), (-10, -1), (+1, +10), (-5, +5), (-5, -1), (+1, +5), (-1, +1) and (-1, 0). Cumulative abnormal returns are calculated before and after the announcement of the split in order to capture possible information leakages or sluggish market reaction and check for market efficiency. Additionally, in order to compute the cumulative abnormal returns of the samples, the average of the cumulative abnormal returns, which is presented in equation (7), is used both for the Market model and the Market adjusted model.

$$ACAR_T = \sum_{i=1}^{N} \frac{CAR_{i,T}}{N} \quad (7)$$

Moreover, in order to determine statistical significance, that is, whether abnormal returns or the average abnormal return of the splitting firms for day *t* are significantly different from zero, the t-statistic, as recommended by Brown and Warner (1985) in the presence of event clustering to take into account cross-sectional correlation is computed. The *t*-statistic is calculated in equation (9) and (10) for the Market model and the Market adjusted model, respectively.

$$T\text{-}stat = \overline{AR}_t / \hat{S}(\overline{AR}_t) \quad (9)$$

$$T\text{-}stat = \overline{AR}_t / \hat{S}(\overline{AR}_t) * \sqrt{N} \quad (10)$$

In equation (9), $\overline{AR}_t$, is the average of the abnormal returns for day *t*, while $\hat{S}(\overline{AR}_t)$ is the estimated standard deviation of the abnormal returns of the splitting firms from day -250 to day -11. On the other hand, in equation (10), $\overline{AR}_t$, represents the average abnormal return for day *t*, $\hat{S}(\overline{AR}_t)$ the estimated standard deviation of the average abnormal return of the splitting firms for day t and N the number of stocks that announced a split. Similarly, for the average of the cumulative abnormal returns, *t*-statistic is calculated in equation (11) and (12) for the Market model and the Market adjusted model, respectively.

$$T\text{-}stat = \overline{CAR}_T / \hat{S}(\overline{CAR}_T) * \sqrt{T} \quad (11)$$

$$T\text{-}stat = \overline{CAR}_T / \hat{S}(\overline{CAR}_T) * \sqrt{T} \quad (12)$$

Finally, in equation (11), $\overline{CAR}_T$, is the average of the cumulative abnormal returns for a specific period T, while $\hat{S}(\overline{CAR}_T)$ is the estimated standard deviation of the average of the abnormal returns of the splitting firms from day -250 to day -11 and T is the specific period. On the other hand, in equation (12), $\overline{CAR}_T$, represents the average cumulative abnormal return for a specific period T, $\hat{S}(CAR_T)$ the estimated standard deviation of the average cumulative abnormal return of the splitting firms for the specific period T and T is the specific period.

Chapter 6

Test and Results

Price reaction is tested relative to the announcement of the stock split. The price reaction (given by daily abnormal returns and cumulative abnormal returns) is estimated by applying the market model and the market-adjusted returns model. The composite index of the FSE is used as the proxy for the market portfolio. To apply the event type methodology, returns are computed over 261 days, from day -250 to day +10 relative to event day, which is day 0.

6.1 Announcement price effects

Tables 4, 5, 6, 7, 8, 9 and 10 report the findings associated with the announcement day for each sample examined. In particular, they show the event days -10 to +10 relative to the announcement day (event day 0), the daily abnormal returns for each event day -10 to +10 relative to event day 0, the t- statistics (t[AR]) for the corresponding ARs and the cumulative abnormal returns (CAR) and associated t-statistics (t[CAR]) for the intervals (-10 +10), (-10 -1), (+1 +10), (-5 +5), (-5 -1), (+1 +5), (-1 +1) and (-1 0) around event day 0.

Table 4: Abnormal returns (AR) & Cumulative abnormal returns (CAR) around the Announcement of German Stock Splits for the Market model and Market-adjusted model ("full" sample-all split factors)

Panel A: Abnormal Returns around Stock Splits

N=194	Market Model		Market-adjusted Model	
Days	AR%	t-statistic	AR%	t-statistic
-10	0.153%	0.52	0.221%	0.91
-9	0.132%	0.45	0.158%	0.62
-8	0.313%	1.06	0.431%	1.53
-7	0.614%**	2.07	0.759%*	1.92
-6	-0.218%	-0.74	-0.283%	-1.05
-5	-0.142%	-0.48	0.296%	1.18
-4	-0.075%	-0.25	-0.099%	-0.38
-3	-0.547%*	-1.85	-0.485%	-1.58
-2	0.211%	0.71	0.127%	0.35
-1	0.098%	0.33	0.243%	0.75
0	-0.295%	-0.99	0.044%	-0.14
1	0.380%	1.28	0.288%	0.25
2	-0.268%	-0.90	-4.404%**	-2.19
3	-1.855%***	-6.26	-1.876%*	-1.82
4	-0.520%*	-1.75	-0.316%	-0.61
5	-1.983%***	-6.69	-1.789%	-1.57
6	-0.293%	-0.99	-0.094%	-0.35
7	-0.881%***	-2.97	-0.843%	-0.93
8	-0.833%***	-2.81	-0.786%	-1.41
9	-0.796%***	-2.69	-0.792%**	-2.52
10	0.234%	0.79	0.351%	1.40

Panel B: Cumulative Abnormal returns around Stock Splits

	Market Model		Market-adjusted Model	
Event Window	CAR%	t-statistic	CAR%	t-statistic
(-10 +10)	-14.473%***	-10.66	-8.755%***	-2.71
(-10 -1)	0.610%	0.65	1.339%	1.56
(+1 +10)	-14.571%***	-15.55	-10.051%***	-3.27
(-5 +5)	-7.218%***	-7.35	-7.894%***	-2.71
(-5 -1)	-0.554%	-0.84	0.079%	0.11
(+1 +5)	-6.657%***	-10.05	-7.931%***	-2.78
(-1 +1)	0.301%	0.59	0.476%	0.42
(-1 0)	-0.225%	-0.54	0.195%	0.48

Notes: *Abnormal returns are calculated using the market model as follows:* $AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$ *where* $R_{i,t}$ *is the return of firm i on day t and* $R_{m,t}$ *is the market return on day t. Abnormal returns are calculated using the market-adjusted model as follows:* $AR_{i,t} = R_{i,t} - R_{m,t}$.
, ** and * denotes statistical significance at the 10%, 5% and 1% level, respectively.*

Panel A of Table 4 reports the abnormal returns (ARs) of the stocks of the "full" sample for each of the 20 days surrounding the event. Based on the market model, we observe abnormal returns of 0.211%, 0.098%, -0.295%, 0.380% and -0.268% for days -2, -1, 0, +1 and +2, respectively. All these abnormal returns are statistically non-

significant at any conventional level indicating that stock split announcements do not bring about significant stock price appreciations to investors. Moreover, it can be observed that the abnormal return seven days prior to the announcement day is the only positive (0.614%) and statistically significant at the 5% level abnormal return. The market-adjusted model, on the other hand, for the same range of days also indicates that there are not statistically significant abnormal returns at any conventional level at the two days prior to the announcement, the day of the announcement (day 0) and one day post to the announcement, while two days post the announcement the abnormal return is statistically significant at the 5 % level. The abnormal returns for each of these days are 0.127%, 0.243%, -0.044%, 0.288% and -4.404%, respectively. However, as in the market model the results indicate that stock split announcements do not induce significant stock price appreciations to investors. Additionally, it can be seen that also in this case the only positive and statistically significant abnormal return is the abnormal return seven days prior to the announcement (0.759%).

Panel B of Table 4 presents the cumulative abnormal returns (CARs) of the same sample for several event windows based on both models. Market model CARs range from -14.571% to 0.610%. More particularly, for the (-1, +1) and (-1, 0) event windows, the CARs are 0.301% and -0.225%, respectively. It is also important to mention that the CARs for both these event windows are statistically non-significant at any conventional level. Moreover, the lowest price of -14.571% refers to the (+1, +10) event window, while the highest price of 0.610% to the (-10, -1) event window. The CARs based on market-adjusted model provide quite similar results. They range from -10.051% to 1.339% and for the event windows (-1, +1) and (-1, 0) the CARs are both positive and statistically insignificant at any conventional level (0.476% and 0.195%). Similarly, the lowest price of -10.051% refers to the (+1, +10) event window and the highest price of 1.339% refers to the (-10, -1) event window.

The results from both models show that there is no market reaction relative to the announcement of a stock split. The evidence derived from the results is in contrast with the results of previous studies, as specially for the case of Germany it was found (Wulff, 2002) that there was low positive but statistically insignificant abnormal return at the announcement date itself, while at the following day the abnormal return was still positive but statistically significant. However, our findings are consistent with our initial expectations that there would be no announcement effect associated with stock splits

undertaken during the years 2008 and 2009, due to the global economic crisis that has affected negatively the stock prices and the fundamentals of German firms.

Table 5: Abnormal returns (AR) & Cumulative abnormal returns (CAR) around the Announcement of German Stock Splits for the Market model and Market adjusted model ("full" sample-Split factor ≥ 3)

Panel A: Abnormal Returns around Stock Splits

N=104	Market Model		Market-adjusted Model	
Days	AR%	t-statistic	AR%	t-statistic
-10	0.676%	1.53	0.856%**	2.46
-9	-0.795%*	-1.80	-0.683%*	-1.92
-8	0.059%	0.13	0.083%	0.25
-7	1.554%***	3.52	1.592%**	2.09
-6	0.057%	0.13	-0.145%	-0.38
-5	-0.215%	-0.49	0.220%	0.79
-4	-0.289%	-0.66	-0.378%	-1.13
-3	-0.375%	-0.85	-0.274%	-0.80
-2	0.819%*	1.86	0.952%**	2.21
-1	-0.279%	-0.63	-0.279%	-0.67
0	0.241%	0.55	0.379%	0.80
1	-0.680%	-1.54	-0.736%	-0.39
2	-0.191%	-0.43	-10.222%**	-2.40
3	-3.826%***	-8.67	-4.029%	-1.66
4	-0.076%	-0.17	-0.068%	-0.07
5	-5.033%***	-11.40	-4.699%*	-1.88
6	-1.609%***	-3.64	-1.573%	-0.97
7	-3.740%***	-8.47	-3.670%	-1.32
8	-1.334%***	-3.02	-1.453%	-1.25
9	-0.446%	-1.01	-0.426%	-1.39
10	0.319%	0.72	0.336%	1.02

Panel B: Cumulative Abnormal returns around Stock Splits

	Market Model		Market-adjusted	
Event Window	CAR%	t-statistic	CAR%	t-statistic
(-10 +10)	-23.424%***	-11.58	-23.752%***	-3.31
(-10 -1)	0.937%	0.67	1.905%	1.54
(+1 +10)	-24.242%***	-17.37	-26.029%***	-3.71
(-5 +5)	-12.231%***	-8.36	-18.766%***	-3.04
(-5 -1)	-0.717%	-0.73	0.236%	0.33
(+1 +5)	-11.760%***	-11.92	-19.373%***	-3.12
(-1 +1)	-0.207%	-0.27	-0.624%	-0.33
(-1 0)	-0.151%	-0.24	0.098%	0.19

Notes: *Abnormal returns are calculated using the market model as follows:* $AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$ *where* $R_{i,t}$ *is the return of firm i on day t and* $R_{m,t}$ *is the market return on day t. Abnormal returns are calculated using the market-adjusted model as follows:* $AR_{i,t} = R_{i,t} - R_{m,t}$.

, ** and * denotes statistical significance at the 10%, 5% and 1% level, respectively.*

Panel A of Table 5 reports the abnormal returns (ARs) of the stocks with split factor higher or equal to 3 of the "full" sample for each of the 20 days surrounding the event. Based on the market model, we observe abnormal returns of 0.819%, -0.279%, 0.241%, -0.680% and -0.191% for days -2, -1, 0, +1 and +2, respectively. All these abnormal returns are statistically non-significant at ant conventional level except for the abnormal return of day -2 which is both positive and statistically significant at the 10% level. However, the results indicate that stock split announcements do not induce significant stock price appreciations to investors. Moreover, we can observe that as in the original "full" sample the abnormal return seven days prior the announcement is also positive (1.554%) and statistically significant at the 1% level. The market-adjusted model, on the other hand, for the same range of days indicates that there are only two statistically significant at the 5% level abnormal returns two days prior and two days post to the announcement, but there are not statistically significant at any conventional level abnormal returns one day prior to the announcement, the day of the announcement (day 0) and one day post to the announcement. The abnormal returns for days -2, -1, 0, +1, +2 are 0.952%, -0.279%, 0.379%, -0.736% and -10.222%, respectively. However, as in the market model the results indicate that stock split announcements do not induce significant stock price appreciations to investors. Additionally, we can see that the abnormal return ten days and seven days prior to the announcement is positive (0.856% and 1.592%) and statistically significant.

Panel B of table 5 presents the cumulative abnormal returns (CARs) of the same sample for several event windows based on both models. Market model CARs range from -24.242% to 0.937%. More particularly, for the (-1, +1) and (-1, 0) event windows, the CARs are -0.207% and -0.151%, respectively. It is also important to mention that the CARs for both these event windows are statistically non-significant at any conventional level. Moreover, the lowest price of -24.242% refers to the (+1, +10) event window, while the highest price of 0.937% to the (-10, -1) event window. The CARs based on market-adjusted model provide quite similar results. They range from -26.029% to 1.905% and for the event windows (-1, +1) and (-1, 0) the CARs are statistically insignificant at any conventional level (-0.624% and 0.098%). Similarly, the lowest price of -26.029% refers to the (+1, +10) event window and the highest price of 1.905% refers to the (-10, -1) event window.

The results of this sub-sample with split factor higher or equal to 3 do not provide any substantial difference from the results of the original "full" sample.

Table 6: Abnormal returns (AR) & Cumulative abnormal returns (CAR) around the Announcement of German Stock Splits for the Market model and Market adjusted model ("full" sample-Split factor < 3)

Panel A: Abnormal Returns around Stock Splits

N=90	Market Model		Market-adjusted Model	
Days	AR%	t-statistic	AR%	t-statistic
-10	-0.337%	-0.82	-0.399%	-1.03
-9	1.063%**	2.58	1.015%**	2.54
-8	0.607%	1.47	0.834%*	1.75
-7	-0.232%	-0.56	-0.022%	-0.05
-6	-0.470%	-1.14	-0.403%	-0.96
-5	0.117%	0.28	0.384%	0.88
-4	0.213%	0.52	0.037%	0.08
-3	-0.732%*	-1.78	-0.720%	-1.35
-2	-0.784%*	-1.90	-1.363%	-1.55
-1	0.716%*	1.74	1.016%*	1.79
0	-1.077%**	-2.61	-0.711%	-1.34
1	1.865%***	4.53	1.726%	1.19
2	-0.118%	-0.29	0.326%	0.41
3	-0.327%	-0.79	-0.243%	-0.58
4	-0.691%*	-1.68	-0.292%	-0.48
5	0.424%	1.03	0.477%	0.94
6	-0.345%	-0.84	0.047%	0.14
7	-0.014%	-0.03	-0.003%	-0.01
8	-0.792%*	-1.92	-0.567%	-0.65
9	-1.387%***	-3.37	-1.360%*	-1.93
10	0.326%	0.79	0.548%	1.12

Panel B: Cumulative Abnormal returns around Stock Splits

	Market Model		Market-adjusted	
Event Window	CAR%	t-statistic	CAR%	t-statistic
(-10 +10)	-4.338%**	-2.30	0.321%	0.11
(-10 -1)	0.231%	0.18	0.372%	0.24
(+1 +10)	-4.043%***	-3.10	0.645%	0.28
(-5 +5)	-2.066%	-1.51	0.624%	0.27
(-5 -1)	-0.346%	-0.38	-0.631%	-0.54
(+1 +5)	-1.362%	-1.48	1.950%	1.00
(-1 +1)	0.891%	1.25	1.985%	1.41
(-1 0)	-0.474%	-0.81	0.298%	0.39

Notes: *Abnormal returns are calculated using the market model as follows:* $AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$ *where* $R_{i,t}$ *is the return of firm i on day t and* $R_{m,t}$ *is the market return on day t. Abnormal returns are calculated using the market-adjusted model as follows:* $AR_{i,t} = R_{i,t} - R_{m,t}$.
, ** and * denotes statistical significance at the 10%, 5% and 1% level, respectively.*

Panel A of Table 6 reports the abnormal returns (ARs) of the stocks with split factor lower than 3 of the "full" sample for each of the 20 days surrounding the event. Based on the market model, we observe abnormal returns of -0.784%, 0.716%, -1.077%, 1.865% and -0.118% for days -2, -1, 0, +1 and +2, respectively. Regarding to this range

of days, day +2 is statistically insignificant at any conventional level, while all the other abnormal returns are statistically significant at the 10% level for days -2 and -1, at the 5% level for day 0 and at the 1% level for day +1. The abnormal returns at days -1 and +1 indicate that stock split announcements generate significant stock price appreciations to investors. Moreover, we can observe that the abnormal returns nine days prior to the announcement is positive (1.063%) and statistically significant at the 5% level. The market-adjusted model, on the other hand, for the same range of days indicates that there is only one statistically significant at the 10% level abnormal return one day prior to the announcement, while there are not statistically significant abnormal returns at any conventional level two days prior to the announcement, the day of the announcement (day 0) and one and two days post to the announcement. The abnormal returns for the days -2, -1, 0, +1, +2 are -1.363%, 1.016%, -0.711%, 1.726% and 0.326%, respectively. Similarly to the market model, the abnormal return at day -1 indicates that stock split announcements may induce significant stock price appreciations to investors. Additionally, we can see that the abnormal return nine days and eight days prior the announcement is positive (1.015% and 0.834%) and statistically significant at the 5% and 10% level, respectively.

Panel B of table 6 presents the cumulative abnormal returns (CARs) of the same sample for several event windows based on both models. Market model CARs range from -4.338% to 0.891%. More particularly, for the (-1, +1) and (-1, 0) event windows, the CARs are 0.891% and -0.474%, respectively. It is also important to mention that the CARs for both these event windows are statistically non-significant at any conventional level. Moreover, the lowest price of -4.338% refers to the (-10, +10) event window, while the highest price of 0.891% refers to the (-1, +1) event window. The CARs based on market-adjusted model provide quite similar results. They range from -0.631% to 1.985% and for the event windows (-1, +1) and (-1, 0) the CARs are statistically insignificant at any conventional level (1.985% and 0.298%). Furthermore, the lowest price of -0.631% refers to the (-5, -1) event window and the highest price of 1.985% refers to the (-1, +1) event window.

Contrary to the results of the original "full" sample and its sub-sample with split factors higher than 3, the results of the sub-sample with split factor lower than 3 indicate that there may be a stock price reaction associated with the announcement of stock splits. These results suggest that stock splits with split factor lower than 3 may generate similar

announcement price reaction as that found in other studies in Germany (Wulff, 2002), U.S. (Lamoureux and Poon, 1987) and other capital markets.

Table 7: Abnormal returns (AR) & Cumulative abnormal returns (CAR) around the Announcement of German Stock Splits for the Market model and Market adjusted model ("Pure" sample-all split factors)

Panel A: Abnormal Returns around Stock Splits

N=160	Market Model		Market-adjusted Model	
Days	AR%	t-statistic	AR%	t-statistic
-10	0.204%	0.55	0.281%	1.03
-9	0.067%	0.18	0.147%	0.54
-8	0.122%	0.33	0.268%	0.87
-7	0.867%**	2.35	0.800%*	1.72
-6	-0.322%	-0.87	-0.420%	-1.36
-5	0.065%	0.18	0.482%*	1.71
-4	-0.337%	-0.91	-0.248%	-0.85
-3	-0.434%	-1.18	-0.479%	-1.37
-2	0.256%	0.70	0.117%	0.28
-1	0.139%	0.38	0.268%	0.70
0	0.093%	0.25	0.070%	0.20
1	0.154%	0.42	0.130%	0.09
2	-0.741%**	-2.01	-5.611%**	-2.30
3	-2.075%***	-5.63	-2.034%	-1.62
4	-0.640%*	-1.74	-0.452%	-0.78
5	-2.522%***	-6.84	-2.306%*	-1.67
6	-0.296%	-0.80	-0.064%	-0.21
7	-0.053%	-0.14	0.101%	0.29
8	-0.934%**	-2.53	-0.938%	-1.41
9	-0.949%**	-2.57	-0.942%**	-2.56
10	0.097%	0.26	0.199%	0.70

Panel B: Cumulative Abnormal returns around Stock Splits

	Market Model		Market-adjusted Model	
Event Window	CAR%	t-statistic	CAR%	t-statistic
(-10 +10)	-16.787%***	-9.94	-10.364%***	-2.76
(-10 -1)	0.877%	0.75	1.187%	1.17
(+1 +10)	-17.211%***	-14.77	-11.619%***	-3.26
(-5 +5)	-8.888%***	-7.27	-9.811%***	-2.80
(-5 -1)	-0.482%	-0.59	0.138%	0.17
(+1 +5)	-8.568%***	-10.40	-10.016%***	-2.92
(-1 +1)	0.220%	0.35	0.456%	0.34
(-1 0)	-0.111%	-0.21	0.330%	0.70

Notes: *Abnormal returns are calculated using the market model as follows:* $AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$ *where* $R_{i,t}$ *is the return of firm i on day t and* $R_{m,t}$ *is the market return on day t. Abnormal returns are calculated using the market-adjusted model as follows:* $AR_{i,t} = R_{i,t} - R_{m,t}$.

, ** and * denotes statistical significance at the 10%, 5% and 1% level, respectively.*

Panel A of Table 7 reports the abnormal returns (ARs) of the stocks of the "pure" sample for each of the 20 days surrounding the event (day 0). Based on the market model, we observe abnormal returns of 0.256%, 0.139%, 0.093%, 0.154% and -0.741% for days -2, -1, 0, +1 and +2, respectively. All these abnormal returns are statistically non-significant at ant conventional level except for the abnormal return of day +2, which is negative and statistically significant at the 5% level. This range of days indicates that stock split announcements do not bring about significant stock price appreciations to investors. Moreover, we can observe that as in the original "full" sample and in its sub-sample with split factor higher than 3, the abnormal return seven days prior to the announcement date is also positive (0.867%) and statistically significant at the 5% level. Similarly, the market-adjusted model for the same range of days also indicates that there are not statistically significant at any conventional level abnormal returns, except for the abnormal return two days post to the announcement, which is negative and statistically significant at the 5% level. The abnormal returns for days -2, -1, 0, +1 and +2 are 0.117%, 0.268%, 0.070%, 0.130% and -5.611%, respectively. Similarly, as in the market model, the results indicate that stock split announcements do not induce significant stock price appreciations to investors. Additionally, we can see that the abnormal returns seven days and five days prior to the announcement date are both positive (0.800% and 0.482%) and statistically significant the 10% level.

Panel B of table 7 presents the cumulative abnormal returns (CARs) of the same sample for several event windows based on both models. Market model CARs range from -17.211% to 0.877%. More particularly, for the (-1, +1) and (-1, 0) event windows, the CARs are 0.220% and -0.111%, respectively. However, also in this case is important to mention that the CARs for both these event windows are statistically non-significant at any conventional level. Moreover, the lowest price of -17.211% refers to the (+1, +10) event window, while the highest price of 0.877% to the (-10, -1) event window. The CARs based on market-adjusted model provide quite similar results. They range from -11.619% to 1.187% and for the event windows (-1, +1) and (-1, 0) the CARs are statistically insignificant at any conventional level (0.456% and 0.330%). Finally, the lowest price of -11.619% refers to the (+1, +10) event window and the highest price of 1.187% refers to the (-10, -1) event window.

The results from both models are in line with those of the original "full" sample and its sub-sample with split factor higher than 3 and contrary to those of previous studies in Germany (Wulff, 2002) and other capital markets, such as in U.S (Lakonishok & Lev,

1987) and (McNichols & Dravid, 1990), Spain (Yagüe et al., 2009) and India (Mishra, 2007), as no announcement effect is associated with stock splits. Despite the fact that thirty-four cases were deleted from the original "full" sample, as their announcement day coincided with the announcement day of another corporate event of the same stock, such as a stock dividend or a rights issue no changes in the results was found. Finally, the results are in line with the initial expectation that there would be no announcement effect associated only with stock splits undertaken during the years 2008 and 2009, due to the global economic crisis that has affected negatively the stock prices and the fundamentals of German firms.

Table 8: Abnormal returns (AR) & Cumulative abnormal returns (CAR) around the Announcement of German Stock Splits for the Market model and Market adjusted model ("Pure" sample-Split factor ≥ 3)

Panel A: Abnormal Returns around Stock Splits

N=90	Market Model		Market-adjusted Model	
Days	AR%	t-statistic	AR%	t-statistic
-10	0.662%	1.37	0.854%**	2.18
-9	-0.760%	-1.58	-0.608%	-1.51
-8	0.087%	0.18	0.159%	0.45
-7	1.836%***	3.81	1.786%**	2.04
-6	0.222%	0.46	-0.001%	0.00
-5	-0.012%	-0.02	0.378%	1.23
-4	-0.483%	-1.00	-0.493%	-1.29
-3	-0.351%	-0.73	-0.415%	-1.13
-2	0.944%*	1.96	1.078%**	2.27
-1	-0.345%	-0.72	-0.361%	-0.77
0	0.259%	0.54	0.526%	1.04
1	-0.667%	-1.38	-0.635%	-0.29
2	-0.253%	-0.52	-11.856%**	-2.41
3	-4.473%***	-9.28	-4.580%	-1.63
4	-0.227%	-0.47	-0.165%	-0.15
5	-5.986%***	-12.42	-5.523%*	-1.92
6	-1.859%***	-3.86	-1.722%	-0.92
7	-2.824%***	-5.86	-2.658%	-1.00
8	-1.361%***	-2.82	-1.481%	-1.10
9	-0.539%	-1.12	-0.472%	-1.39
10	0.249%	0.52	0.246%	0.68

Panel B: Cumulative Abnormal returns around Stock Splits

	Market Model		Market-adjusted Model	
Event Window	CAR%	t-statistic	CAR%	t-statistic
(-10 +10)	-25.561%***	-11.57	-25.365%***	-3.13
(-10 -1)	1.478%	0.97	2.324%	1.63
(+1 +10)	-26.875%***	-17.63	-28.203%***	-3.57
(-5 +5)	-14.318%***	-8.96	-21.555%***	-3.04
(-5 -1)	-0.692%	-0.64	0.182%	0.22
(+1 +5)	-13.891%***	-12.89	-22.252%***	-3.12
(-1 +1)	-0.153%	-0.18	-0.459%	-0.21
(-1 0)	-0.218%	-0.32	0.162%	0.29

Notes: *Abnormal returns are calculated using the market model as follows:* $AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$ *where* $R_{i,t}$ *is the return of firm i on day t and* $R_{m,t}$ *is the market return on day t. Abnormal returns are calculated using the market-adjusted model as follows:* $AR_{i,t} = R_{i,t} - R_{m,t}$.
, ** and * denotes statistical significance at the 10%, 5% and 1% level, respectively.*

Panel A of Table 8 reports the abnormal returns (ARs) of the stocks with split factor higher or equal to 3 of the "pure" sample for each of the 20 days surrounding the event. Based on the market model, we observe abnormal returns of 0.944%, -0.345%, 0.259%, -0.667% and -0.253% for days -2, -1, 0, +1 and +2, respectively. Moreover, we

can observe that there is only one statistically significant at the 10% level abnormal return two days prior to the announcement, but there are not statistically significant at any conventional level abnormal returns one day prior to the announcement, the day of the announcement (day 0), one and two days post to the announcement. This range of days indicates that stock split announcements do not induce significant stock price appreciations to investors. Furthermore, we can observe that as in the previous samples except for the "full" sample with split factor lower than 3, the abnormal return seven days prior to the announcement date is also positive (1.836%) and statistically significant. On the other hand, for the same range of days the market-adjusted model indicates that there are only two statistically significant at the 5% level abnormal returns two days prior and two days post to the announcement, but there are not statistically significant at any conventional level abnormal returns one day prior to the announcement, the day of the announcement (day 0) and one day post to the announcement. The abnormal returns for days -2, -1, 0, +1 and +2 are 1.078%, -0.361%, 0.526%, -0.635% and -11.856%, respectively. Similarly, as in the market model, the results indicate that stock split announcements do not induce significant stock price appreciations to investors. Similarly to the "full" sample with split factor higher than 3, we can see that the abnormal return ten days and seven days prior to the announcement date are also positive (0.854% and 1.786%) and statistically significant at the 5% level.

Panel B of table 8 presents the cumulative abnormal returns (CARs) of the same sample for several event windows based on both models. Market model CARs range from -26.875% to 1.478%. More particularly, for the (-1, +1) and (-1, 0) event windows, the CARs are -0.153% and -0.218%, respectively. However, also in this case is important to mention that the CARs for both these event windows are statistically non-significant at any conventional level. Moreover, the lowest price of -26.875% refers to the (+1, +10) event window, while the highest price of 1.478% to the (-10, -1) event window. The CARs based on market-adjusted model provide quite similar results. They range from -28.203% to 2.324% and for the event windows (-1, +1) and (-1, 0) the CARs are statistically insignificant at any conventional level (-0.459% and 0.162%). Finally, the lowest price of -28.203% refers to the (+1, +10) event window, while the highest price of 2.324% to the (-10, -1) event window.

The results of this sub-sample with split factor higher or equal to 3 do not provide any substantial difference from the results of the original "pure" sample. The only difference that can be mentioned is the existence of statistically significant

abnormal return two days prior to the announcement day, which however cannot lead to a different conclusion as there is no other statistically significant at any conventional level abnormal return in the other days around the announcement day.

Table 9: Abnormal returns (AR) & Cumulative abnormal returns (CAR) around the Announcement of German Stock Splits for the Market model and Market adjusted model ("Pure" sample-Split factor < 3)

Panel A: Abnormal Returns around Stock Splits

N=70	Market Model		Market-adjusted Model	
Days	AR%	t-statistic	AR%	t-statistic
-10	-0.211%	-0.22	-0.288%	-0.57
-9	0.968%	1.01	1.038%**	2.09
-8	0.135%	0.14	0.362%	0.57
-7	0.214%	0.22	0.280%	0.38
-6	-1.120%	-1.17	-1.124%*	-1.85
-5	0.259%	0.27	0.613%	0.71
-4	-0.109%	-0.11	0.975%	0.76
-3	-0.108%	-0.11	-0.141%	-0.11
-2	-1.253%	-1.31	-2.015%	-1.34
-1	1.437%	1.50	1.744%	1.36
0	-0.397%	-0.41	-0.228%	-0.09
1	0.720%	0.75	0.634%	0.22
2	-1.305%	-1.36	0.562%	0.27
3	-0.800%	-0.83	-0.668%	-0.60
4	-1.241%	-1.29	-0.960%	-0.79
5	-0.101%	-0.10	-0.124%	-0.12
6	-0.521%	-0.54	-0.159%	-0.32
7	0.554%	0.58	0.752%	1.11
8	-1.309%	-1.36	-1.175%	-0.74
9	-2.667%***	-2.78	-2.765%*	-1.88
10	0.940%	0.98	1.155%	1.02

Panel B: Cumulative Abnormal returns around Stock Splits

	Market Model		Market-adjusted	
Event Window	CAR%	t-statistic	CAR%	t-statistic
(-10 +10)	-5.874%	-1.34	-1.533%	-0.46
(-10 -1)	0.229%	0.08	1.442%	1.31
(+1 +10)	-5.712%*	-1.88	-2.748%	-0.85
(-5 +5)	-2.858%	-0.90	0.391%	0.13
(-5 -1)	0.242%	0.11	1.175%	1.13
(+1 +5)	-2.709%	-1.26	-0.556%	-0.19
(-1 +1)	1.766%	1.06	2.151%	0.61
(-1 0)	1.046%	0.77	1.517%	0.41

Notes: *Abnormal returns are calculated using the market model as follows:* $AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$ *where* $R_{i,t}$ *is the return of firm i on day t and* $R_{m,t}$ *is the market return on day t. Abnormal returns are calculated using the market-adjusted model as follows:* $AR_{i,t} = R_{i,t} - R_{m,t}$.

, ** and * denotes statistical significance at the 10%, 5% and 1% level, respectively.*

Panel A of Table 9 reports the abnormal returns (ARs) of the stocks with split factor lower than 3 of the "pure" sample for each of the 20 days surrounding the event. Based on the market model, we observe abnormal returns of -1.253%, 1.437%, -0.397%, 0.720% and 1.305% for days -2, -1, 0, +1 and +2, respectively. All these abnormal returns are statistically non-significant at any conventional level indicating that stock split announcements do not bring about significant price appreciations to investors. Additionally, the market-adjusted model, for the same range of days, also indicates that there are not statistically significant at any conventional level abnormal returns at the two days prior to the announcement, the day of the announcement (day 0), one and two days post to the announcement. The abnormal returns for each of these days are -2.015%, 1.744%, -0.228%, 0.634% and 0.562%, respectively. Similarly, as in the market model, the results indicate that stock split announcements do not induce significant stock price appreciations to investors. Additionally, we can see that the abnormal return nine days prior to the announcement date is positive (1.038%) and statistically significant at the 5% level.

Panel B of table 9 presents the cumulative abnormal returns (CARs) of the same sample for several event windows based on both models. Market model CARs range from -5.874% to 1.766%. More specifically, for the (-1, +1) and (-1, 0) event windows, the CARs are 1.766% and 1.046%, respectively. However, also in this case is important to mention that the CARs for both these event windows are statistically non-significant at any conventional level. Moreover, the lowest price of -5.874% refers to the (-10, +10) event window and the highest price of 1.766% refers to the (-1, +1) event window. The CARs based on market-adjusted model provide quite similar results. They range from -2.748% to 2.151% and for the event windows (-1, +1) and (-1, 0) the CARs are statistically insignificant at any conventional level (2.151% and 1.517%). Finally, the lowest price of -2.748% refers to the (+1, +10) event window and the highest price of 2.151% refers to the (-1, +1) event window.

As in the previous sub-sample the results of this sub-sample with split factor lower than 3 do not provide any substantial difference from the results of the original "pure" sample. We can conclude though, that the division of the original "pure" sample to two sub-samples based on the split factors does not affect the existence of positive and statistically significant abnormal returns around the announcement day.

Table 10: Abnormal returns (AR) & Cumulative abnormal returns (CAR) around the Announcement of German Stock Splits for the Market model and Market adjusted model ("Contaminated" sample-all split factors)

Panel A: Abnormal Returns around Stock Splits

N=34	Market Model		Market-adjusted Model	
Days	AR%	t-statistic	AR%	t-statistic
-10	-0.330%	-0.55	-0.345%	-0.46
-9	0.535%	0.89	0.255%	0.35
-8	1.686%***	2.81	1.666%	1.57
-7	-1.882%***	-3.14	-1.330%	-0.68
-6	0.260%	0.43	0.344%	0.67
-5	-0.780%	-1.30	-0.560%	-1.07
-4	0.815%	1.36	0.585%	1.01
-3	-1.064%*	-1.77	-0.516%	-0.81
-2	0.104%	0.17	0.170%	0.27
-1	0.043%	0.07	0.124%	0.29
0	-0.712%	-1.19	-0.563%	-0.78
1	1.418%**	2.37	1.010%	1.09
2	1.015%	1.69	1.134%*	1.76
3	-0.842%	-1.41	-1.151%**	-2.65
4	0.032%	0.05	0.308%	0.26
5	0.490%	0.82	0.583%	1.39
6	-0.281%	-0.47	-0.234%	-0.41
7	-4.679%***	-7.81	-5.177%	-1.08
8	-0.371%	-0.62	-0.088%	-0.14
9	-0.098%	-0.16	-0.105%	-0.23
10	0.861%	1.44	1.047%**	2.20

Panel B: Cumulative Abnormal returns around Stock Splits

	Market Model		Market-adjusted	
Event Window	CAR%	t-statistic	CAR%	t-statistic
(-10 +10)	-3.780%	-1.38	-2.842%	-0.53
(-10 -1)	-0.612%	-0.32	0.395%	0.26
(+1 +10)	-2.455%	-1.30	-2.673%	-0.53
(-5 +5)	0.519%	0.26	1.125%	0.62
(-5 -1)	-0.882%	-0.66	-0.196%	-0.20
(+1 +5)	2.113%	1.58	1.884%	1.13
(-1 +1)	0.750%	0.72	0.571%	0.45
(-1 0)	-0.669%	-0.10	-0.439%	-0.57

Notes: *Abnormal returns are calculated using the market model as follows:* $AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$ *where* $R_{i,t}$ *is the return of firm i on day t and* $R_{m,t}$ *is the market return on day t. Abnormal returns are calculated using the market-adjusted model as follows:* $AR_{i,t} = R_{i,t} - R_{m,t}$.
, ** and * denotes statistical significance at the 10%, 5% and 1% level, respectively.*

Panel A of Table 10 reports the abnormal returns (ARs) of the stocks of the "contaminated" sample for each of the 20 days surrounding the event. Based on the market model, we observe abnormal returns of 0.104%, 0.043%, -0.712%, 1.418% and

1.015% for days -2, -1, 0, +1 and +2, respectively. Regarding to this range of days, there is a statistically significant at the 5% level abnormal return only one day post to the announcement of the stock split while all the other abnormal returns are statistically non-significant at any conventional level. The abnormal return at day +1 indicates that stock split announcements generate significant stock price appreciations to investors. Furthermore, we can observe that the abnormal return eight days prior to the announcement date is positive (1.686%) and statistically significant at the 1% level. Moreover, the market-adjusted model for the same range of days also indicates that there is only one statistically significant abnormal return two days post to the announcement, but there are not statistically significant at any conventional level abnormal returns at the two days prior to the announcement, the day of the announcement (day 0) and one day post to the announcement. The abnormal returns for days -2, -1, 0, +1 and +2 are 0.170%, 0.124%, -0.563%, 1.010% and 1.134%, respectively. Similarly to the market model, the abnormal return at day +2 indicates that stock split announcements may induce significant stock price appreciations to investors. Additionally, we can see that the abnormal return ten days post to the announcement date is positive (1.047%) and statistically significant at the 5% level.

Panel B of table 10 presents the cumulative abnormal returns (CARs) of the same sample for several event windows based on both models. Market model CARs range from -3.780% to 2.113%. More particularly, for the (-1, +1) and (-1, 0) event windows, the CARs are 0.750% and -0.669%, respectively. Similarly to previous samples, also in this case the CARs for both these event windows are statistically non-significant at any conventional level. Moreover, the lowest price of -3.780% refers to the (-10, +10) event window, while the highest price of 2.113% to the (+1, +5) event window. The CARs based on market-adjusted model provide quite similar results. They range from -2.842% to 1.884% and for the event windows (-1, +1) and (-1, 0) the CARs are statistically insignificant at any conventional level (0.571% and -0.439%). Finally, the lowest price of -2.842% refers to the (-10, +10) event window and the highest price of 1.884% refers to the (+1, +5) event window.

Contrary to the results of the original “full” and “pure” sample, the results of the “contaminated” sample indicate that there may be a stock price reaction associated with the announcement of stock splits. However, we cannot derive a clear conclusion as apart from the fact that the sample under consideration consist of only 34 companies, thus it is

a small sample, it is also consisted of stocks that have announced contemporarily two different corporate events, a dividend and a stock split.

6.2 Signaling test

The signaling theory of stock splits predicts that managers attempt to convey their private positive expectations about their firm's prospects. Consistent with this, McNichols and Dravid (1990) find significant improvement in earnings per share (EPS) for splitting stocks. (McNichols & Dravid, 1990) Lakonishok and Lev (1987) find that EPS improves in the pre-split period and remains stable afterwards. (Lakonishok & Lev, 1987)

In order to test for signaling effects, pre-split and post-split earnings per share (EPS) are compared. In table 11, 12 and 13 the mean and median earnings per share are reported, along with associated statistics from various years and periods prior and after the year of the split announcement for the "full", the "pure" and the "contaminated" sample, respectively. In each table, panel A reports mean and median earnings per share for all the split factors of the respective sample. The mean and the median reported in panel B are based on earnings per share for split factors higher or equal to 3, which is the median of all the split factors, while panel C reports mean and median earnings per share for split factors lower than 3. The p-value of the t-statistic is used in order to test for the difference in the mean EPS from one period to another, while the Wilcoxon/Mann-Whitney p-value is used to test for the difference of the median EPS from one period to another.

As it can be shown in panel A of Table 11, the mean EPS is 14.48 one year prior to the year of the stock split and it decreases by 11.42 to 3.06 during the year of the stock split, which is denoted as year 0. Additionally, the median EPS for the same time period decreases from 1.33 to 0.70. The reason why mean and median values may differ substantially is the existence of some outliers in the samples' data. The decrease is statistically significant at the 5 percent level for the mean and even for one percent level for the median EPS (p-value is 0.016; Wilcoxon p-value is 0.005). Similarly, the mean EPS has decreased, relative to year -1, to 2.71 in year +1, which is the year just after the year of the stock split, while the median for the same period decreased to 0.43. The decrease is significant at the one percent level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.004 and 0.00, respectively. Furthermore, the mean EPS has also decreased, relative to year -1, to 3.77 in year +2, while the

median for the same period decreased to 0.52. The associated decrease of the mean EPS is statistically significant at the five percent level (p-value is 0.011), while the decrease of the median EPS is statistically significant at the one percent level (Wilcoxon p-value is 0.00). Finally, the mean EPS has decreased, relative to year -1, to 4.14 in year +3, while the median for the same period decreased to 0.51. The associated decrease of the mean EPS is statistically significant at the five percent level (p-value is 0.018), while the decrease of the median EPS is statistically significant at the one percent level (Wilcoxon p-value is 0.00).

Moreover, in panel B of Table 11, it can be observed that the mean EPS is 24.68 one year prior to the year of the stock split and it decreases by 17.2 to 7.48 during the year of the stock split. Additionally, the median EPS for the same time period decreases from 2.47 to 0.69. The decrease is statistically significant at the 5 percent level for the mean and for one percent level for the median EPS (p-value is 0.027; Wilcoxon p-value is 0.004). Similarly, the mean EPS has decreased, relative to year -1, to 1.74 in year +1, while the median for the same period decreased to 0.11. The decrease is significant at the one percent level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.001 and 0.000, respectively. Furthermore, the mean EPS has also decreased, relative to year -1, to 1.82 in year +2, while the median for the same period decreased to 0.29. The decrease is statistically significant at the one percent level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.001 and 0.000, respectively. Finally the mean EPS has decreased, relative to year -1, to 1.46 in year +3, while the median for the same period decreased to 0.17. The decrease is also statistically significant at the one percent level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.002 and 0.000, respectively.

To continue with panel C of table 11, it can be observed that the mean EPS is 4.28 one year prior to the year of the stock split and it decreases by 5.58 to -1.3 during the year of the stock split. Additionally, the median EPS for the same time period decreases from 1.02 to 0.78. The decrease is statistically insignificant at any conventional level for both the mean and the median EPS (p-value is 0.290; Wilcoxon p-value is 0.258). Similarly, the mean EPS has decreased, relative to year -1, to 3.68 in year +1, while the median for the same period decreased to 0.52. The decrease is statistically insignificant at any conventional level for the mean, while it is significant for the median EPS only at 10 percent level, as p-value and Wilcoxon p-value are equal to 0.878 and 0.063, respectively. Contrary to the previous periods the mean EPS

increased, relative to year -1, to 5.67 in year +2, while the median for the same period decreased to 0.73. However, both these changes are statistically insignificant at any conventional level, as p-value and Wilcoxon p-value are equal to 0.749 and 0.229, respectively. Finally the mean EPS has increased, relative to year -1, to 6.68 in year +3, while the median for the same period decreased to 0.76. Both these changes are statistically insignificant at any conventional, as p-value and Wilcoxon p-value are equal to 0.608 and 0.366, respectively.

Generally, we find both in the "full" sample and in its sub-samples a decrease in EPS in the year of the announcement of the stock split and the years following this announcement respect to the value of the EPS one year prior to the announcement of the stock split. Our results are not in line with the majority of the previous studies which found an improvement or no change in EPS. In particular, results are not consistent with those of Lakonishok and Lev (1987) who found that EPS improves in the pre-split period and remains stable afterwards (Lakonishok & Lev, 1987) and those of McNichols and Dravid (1990) who found significant improvement in EPS for splitting stocks. (McNichols & Dravid, 1990). We conclude that evidence does not show that splitting firms realize above average earnings performance prior to the stock split. Finally, the deterioration in EPS can be explained by the fact that the global economic crisis has affected negatively the stock prices and the fundamentals of German firms during the years 2008 and 2009 and as a consequence, contrary to previous literature no signaling effects were observed following stock splits announcements.

Table 11: Mean and Median of Earnings per Share (EPS) surrounding the announcement of Stock Splits ("full" sample)

Panel A: Earnings per share surrounding the announcement of Stock Splits year (all split factors)

Years	-1	0	1	2	3	Period	(-1, 0)	(-1, +1)	(-1, +2)	(-1, +3)
Mean	14,48	3,06	2,71	3,77	4,14	Change	-11,42	-11,77	-10,71	-10,34
Median	1,33	0,70	0,43	0,52	0,51	P-value	0,016**	0,004***	0,011**	0,018**
N	158	157	156	154	146	Wilcoxon p-value	0,005***	0,000***	0,000***	0,000***

Panel B: Earnings per share surrounding the announcement of Stock Splits year (Split factor≥ 3)

Years	-1	0	1	2	3	Period	(-1, 0)	(-1, +1)	(-1, +2)	(-1, +3)
Mean	24,68	7,48	1,74	1,82	1,46	Change	-17,2	-22,94	-22,86	-23,22
Median	2,47	0,69	0,11	0,29	0,17	P-value	0,027**	0,001***	0,001***	0,002***
N	79	78	78	76	71	Wilcoxon p-value	0,006***	0,000***	0,000***	0,000***

Panel C: Earnings per share surrounding the announcement of Stock Splits year (Split factor < 3)

Years	-1	0	1	2	3	Period	(-1, 0)	(-1, +1)	(-1, +2)	(-1, +3)
Mean	4,28	-1,30	3,68	5,67	6,68	Change	-5,58	-0,6	1,39	2,40
Median	1,02	0,78	0,52	0,73	0,76	P-value	0,290	0,878	0,749	0,608
N	79	79	78	78	75	Wilcoxon p-value	0,258	0,063*	0,229	0,366

Notes: *Earnings per Share (EPS) is defined as the net income scaled by number of shares outstanding. ***, ** and * indicate statistical significance at the 1%, 5% and 10%, respectively.*

As for the "pure" sample, in panel A of table 12 the mean EPS is 9.76 one year prior to the year of the stock split and it decreases by 6.85 to 2.91 during the year of the stock split, which is denoted as year 0. Additionally, the median EPS for the same time period decreases from 0.95 to 0.41. The decrease is statistically insignificant at any conventional level for the mean and significant at 5 percent level for the median EPS (p-value is 0.131; Wilcoxon p-value is 0.039). Similarly, the mean EPS has decreased, relative to year -1, to 2.99 in year +1, while the median for the same period decreased to 0.16. The decrease is significant at the 5 percent level for the mean and at the one percent level for the median EPS, as p-value and Wilcoxon p-value are equal to 0.046 and 0.00, respectively. Furthermore, the mean EPS has also decreased, relative to year -1, to 4.17 in year +2, while the median for the same period decreased to 0.33. The associated decrease of the mean EPS is statistically insignificant at any conventional level (p-value is 0.118), while the decrease of the median EPS is statistically significant at the one percent level (Wilcoxon p-value is 0.002). Finally the mean EPS has

decreased, relative to year -1, to 4.66 in year +3, while the median for the same period decreased to 0.30. The associated decrease of the mean EPS is statistically insignificant at any conventional level (p-value is 0.176), while the decrease of the median EPS is statistically significant at the one percent level (Wilcoxon p-value is 0.004).

Moreover, in panel B of table 12, it can be observed that the mean EPS is 14.13 one year prior to the year of the stock split and it decreases by 6.57 to 7.56 during the year of the stock split. Additionally, the median EPS for the same time period decreases from 1.62 to 0.30. The decrease is statistically insignificant at any conventional level for the mean and significant for 5 percent level for the median EPS (p-value is 0.262; Wilcoxon p-value is 0.046). Similarly, the mean EPS has decreased, relative to year -1, to 1.74 in year +1, while the median for the same period decreased to 0.04. The decrease is significant at the one percent level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.006 and 0.00, respectively. Furthermore, the mean EPS has also decreased, relative to year -1, to 1.71 in year +2, while the median for the same period decreased to 0.12. The decrease is statistically significant at the one percent level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.005 and 0.001, respectively. Finally the mean EPS has decreased, relative to year -1, to 1.43 in year +3, while the median for the same period decreased to 0.05. The decrease is also statistically significant at the one percent level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.005 and 0.001, respectively.

To continue with, panel C of table 12 shows that the mean EPS is 4.87 one year prior to the year of the stock split and that it decreases by 7.15 to -2.28 during the year of the stock split. Additionally, the median EPS for the same time period decreases from 0.80 to 0.53. The decrease is statistically insignificant at any conventional level for both the mean and the median EPS (p-value is 0.305; Wilcoxon p-value is 0.305). Similarly, the mean EPS has decreased, relative to year -1, to 4.42 in year +1, while the median for the same period decreased to 0.39. The decrease is statistically insignificant at any conventional level for both the mean and the median EPS, as p-value and Wilcoxon p-value are equal to 0.930 and 0.139, respectively. Contrary to the previous periods the mean EPS increased, relative to year -1, to 6.92 in year +2, while the median for the same period decreased to 0.51. However, both these changes are statistically insignificant at any conventional level, as p-value and Wilcoxon p-value are equal to 0.721 and 0.282, respectively. Finally the mean EPS has increased, relative to year -1, to 8.18 in year +3, while the median for the same period decreased to 0.51. Both these

changes are statistically insignificant at any conventional level, as p-value and Wilcoxon p-value are equal to 0.591 and 0.406, respectively.

The results reported in table 12 for the "pure" sample and its sub-samples do not present substantial difference from those of the "full" sample and its sub-samples as also in this case a deterioration of the EPS in the year of the announcement of the stock split and the following years of the announcement is noticed. Results are again not in line with those of previous studies which found an improvement or no change in EPS (Lakonishok & Lev, 1987), (McNichols & Dravid, 1990) and (Leledakis, Papaioannou, Travlos, & Tsangarakis, 2009) but consistent with our initial expectations about the absence of signaling effects, as the stock prices and the fundamentals of German firms were affected negatively by the global credit crunch.

Table 12: Mean and Median of Earnings per Share (EPS) surrounding the announcement of Stock Splits ("pure" sample)

Panel A: Earnings per share surrounding the announcement of Stock Splits year (all split factors)

Years	-1	0	1	2	3	Period	(-1, 0)	(-1, +1)	(-1, +2)	(-1, +3)
Mean	9,76	2,91	2,99	4,17	4,66	Change	-6,85	-6,77	-5,59	-5,10
Median	0,95	0,41	0,16	0,33	0,30	P-value	0,131	0,046**	0,118	0,176
N	127	127	126	125	119	Wilcoxon p-value	0,039**	0,000***	0,002***	0,004***

Panel B: Earnings per share surrounding the announcement of Stock Splits year (Split factor≥ 3)

Years	-1	0	1	2	3	Period	(-1, 0)	(-1, +1)	(-1, +2)	(-1, +3)
Mean	14,13	7,56	1,74	1,71	1,43	Change	-6,57	-12,39	-12,42	-12,70
Median	1,62	0,30	0,04	0,12	0,05	P-value	0,262	0,006***	0,005***	0,005***
N	67	67	67	66	62	Wilcoxon p-value	0,046**	0,000***	0,001***	0,001***

Panel C: Earnings per share surrounding the announcement of Stock Splits year (Split factor < 3)

Years	-1	0	1	2	3	Period	(-1, 0)	(-1, +1)	(-1, +2)	(-1, +3)
Mean	4,87	-2,28	4,42	6,92	8,18	Change	-7,15	-0,45	2,05	3,31
Median	0,80	0,53	0,39	0,51	0,51	P-value	0,305	0,930	0,721	0,591
N	60	60	59	59	57	Wilcoxon p-value	0,305	0,139	0,282	0,406

Notes: *Earnings per Share (EPS) is defined as the net income scaled by number of shares outstanding. ***, ** and * indicate statistical significance at the 1%, 5% and 10%, respectively.*

In conclusion, in panel A of table 13 the mean EPS is 33.82 one year prior to the year of the stock split and it decreases by 30.12 to 3.7 during the year of the stock split, which is denoted as year 0. Additionally, the median EPS for the same time period

decreases from 2.76 to 1.71. The decrease is statistically significant at 10 percent level for the mean and 5 percent level for the median EPS (p-value is 0.054; Wilcoxon p-value is 0.010). Similarly, the mean EPS has decreased, relative to year -1, to 1.54 in year +1, while the median for the same period decreased to 1.33. The decrease is significant at the 5 percent level for the mean and at the one percent level for the median EPS, as p-value and Wilcoxon p-value are equal to 0.038 and 0.007, respectively. Furthermore, the mean EPS has also decreased, relative to year -1, to 2.03 in year +2, while the median for the same period decreased to 1.52. The associated decrease of the mean EPS is statistically significant at 5 percent level (p-value is 0.044), while the decrease of the median EPS is statistically significant at the one percent level (Wilcoxon p-value is 0.007). Finally the mean EPS has decreased, relative to year -1, to 1.86 in year +3, while the median for the same period decreased to 1.57. The associated decrease of the mean EPS is statistically significant at 10 percent level (p-value is 0.051), while the decrease of the median EPS is statistically significant at the one percent level (Wilcoxon p-value is 0.005).

Finally, also in the "contaminated" sample, which is consisted of stocks that contemporarily announced a stock split and another corporate event of the same stock, such as a stock dividend or a rights issue we observe a decrease in the EPS both in the year of the announcement and the following years, result that supports the assumption that German firms did not experienced superior improvement in earnings and that did not use stock splits to signal superior future earnings performance. Results are again in contrast with those of previous studies which examined a similar sample and found an improvement or no change in EPS (Lakonishok & Lev, 1987), (McNichols & Dravid, 1990) but consistent with our initial expectations about the absence of signaling effects.

Table 13: Mean and Median of Earnings per Share (EPS) surrounding the announcement of Stock Splits ("contaminated" sample)

Panel A: Earnings per share surrounding the announcement of Stock Splits year (all split factors)

Years	-1	0	1	2	3	Period	(-1, 0)	(-1, +1)	(-1, +2)	(-1, +3)
Mean	33,82	3,70	1,54	2,03	1,86	Change	-30,12	--32,28	-31,79	-31,96
Median	2,76	1,71	1,33	1,52	1,57	P-value	0,054*	0,038**	0,044**	0,051*
N	31	30	30	29	27	Wilcoxon p-value	0,010**	0,007***	0,007***	0,005***

Notes: *Earnings per Share (EPS) is defined as the net income scaled by number of shares outstanding. ***, ** and * indicate statistical significance at the 1%, 5% and 10%, respectively.*

Chapter 7

Conclusion

"Although stock splits seem to be a purely cosmetic event, there exists ample empirical evidence from the United States that stock splits are associated with abnormal returns on the announcement day." (Wulff, 2002) This dissertation investigates the stock price reaction to stock splits executed by firms traded on the Frankfurt Stock Exchange during years 2008 and 2009. "In the U.S., as in Germany, stock splits increase the number of shares without leading to an inflow or outflow of cash, without changing the investment opportunities of the corporation, or even without changing its book value. The increase in the number of shares is done by reducing the par value of the share accordingly, while the main difference between stock splits in Germany and the U.S. is largely in the fundamental role of the par value of German stocks. The increase in the number of shares is done by reducing the par value of the share accordingly. The main difference between stock splits in Germany and the U.S. is largely in the fundamental role of the par value of German stocks." (Wulff, 2002)

The study consists of three major samples, which are the "full", the "pure" and the "contaminated" sample and four sub-samples, which are constructed from the division of the "full" and "pure" sample based on the size of the split factor. First, we test whether, as in most countries, the German market reacts positively on the announcement day, generating significantly positive abnormal returns around this day. The price reaction tests are performed relative to the announcement of the stock split. The price reaction is estimated by applying the market model and the market-adjusted returns model. Unlike the evidence of strong positive announcement price effects associated with stock splits in the U.S., there is no price reaction at the announcement of stock splits on the Frankfurt Stock Exchange for stock splits undertaken by German firms during years 2008 and 2009 for any of the sample constructed for the purpose of this study except for the "full" sample with split factor lower than 3 and the "contaminated" sample. Although the latter two samples provide some announcement effect associated with stock splits, this effect does not seem to clearly strengthen the evidence of significant positive reaction around the stock split announcement day.

Generally, the results are not in line with the results of many other studies on stock splits in different capital markets and no evidence of significant positive market reaction around the stock split announcement day is found. As a result, stock split announcements of German firms do not bring about significant stock price appreciations to investors in this particular period examined. Furthermore, the signaling hypothesis, which predicts that managers attempt to convey their private positive expectations about their firm's prospects, was tested. In order to test for signaling effects, pre-split and post-split earning per share (EPS) were compared using equality tests for mean and median earnings per share. The results reported for all samples and sub-samples examined suggest that German firms that split their shares during the years 2008 and 2009, period in which the global economic crisis exploded, did not experience superior improvement in earnings during the year of the split or the years following the year of the split. The results suggest that German firms did not use stock splits to signal superior future earnings performance. Additionally, this study argues that legal restrictions strongly limit the ability of German companies to use a stock split for signaling.

To conclude, the findings of this study do not expand the international evidence about the value consequences of stock splits. It is important to mention that the period selected in order to examine the use of stock split announcements and investigate the market reaction to them, is the period which signals the beginning of the economic crisis. We can assume that the effects of the global economic crisis are the main reason that the findings of our dissertation are in contrast with and differ from those of many other studies on stock splits. However, the results provided do not discard the findings of previous studies which conclude that there is ample empirical evidence from the different capital markets all around the world that stock splits are associated with abnormal returns on the announcement day and have a positive impact on share prices. In order to have a more clear and definite inference about price reaction and signaling effects of stock splits announcement in Germany a larger period of investigation should be taken into consideration expanding the years of research both prior to the year 2008 and post to the year 2009.

Appendix

Table A1

Company	Security ID	Announce/Declared Date	Effective Date	Summary
Quicksilver Resources Inc	QSR GR Equity	7/1/2008	1/2/2008	Adjustment Factor: 2
MICROS Systems Inc	MS6 GR Equity	8/1/2008	6/2/2008	Adjustment Factor: 2
Robbins & Myers Inc	RBB GR Equity	9/1/2008	29/2/2008	Adjustment Factor: 2
PMFG Inc	PFG GR Equity	10/1/2008	18/8/2008	Adjustment Factor: 2
Moshi Moshi Hotline Inc	MMK GR Equity	11/1/2008	28/1/2008	Adjustment Factor: 2
Umicore SA	NVJN GR Equity	11/1/2008	29/2/2008	Adjustment Factor: 5
Top-Wetten AG	SOS GR Equity	15/1/2008	17/1/2008	Adjustment Factor: 3
Public Service Enterprise Group Inc	PSE GR Equity	15/1/2008	5/2/2008	Adjustment Factor: 2
Cia Siderurgica Nacional SA	CQWA GR Equity	17/1/2008	11/2/2008	Adjustment Factor: 3
Energy Metals Ltd	E9M GR Equity	18/1/2008	29/2/2008	Adjustment Factor: 3
RMA Energy Ltd	RMA GR Equity	22/1/2008	7/3/2008	Adjustment Factor: 4
Bank Central Asia Tbk PT	BZG2 GR Equity	22/1/2008	28/1/2008	Adjustment Factor: 2
Hutter & Schrantz Stahlbau AG	HUS GR Equity	23/1/2008	28/1/2008	Adjustment Factor: 3
New Jersey Resources Corp	NJ1 GR Equity	23/1/2008	4/3/2008	Adjustment Factor: 1.5
HL Display AB	H1D GR Equity	24/1/2008	24/4/2008	Adjustment Factor: 4
China Sports International Ltd	3C6A GR Equity	28/1/2008	5/5/2008	Adjustment Factor: 2
Ceotronics AG	CEK GR Equity	30/1/2008	1/2/2008	Adjustment Factor: 3
AppTech Corp	HEJB GR Equity	30/1/2008	15/2/2008	Adjustment Factor: 1.25
Hologic Inc	HO1 GR Equity	30/1/2008	3/4/2008	Adjustment Factor: 2
Gas Natural Inc	38G GR Equity	30/1/2008	5/2/2008	Adjustment Factor: 1.5
Alfa Laval AB	AA9 GR Equity	6/2/2008	5/6/2008	Adjustment Factor: 4
Ballingslov International AB	BLY GR Equity	8/2/2008	27/5/2008	Adjustment Factor: 3
Nobel Biocare Holding AG	NLB1 GR Equity	11/2/2008	3/4/2008	Adjustment Factor: 5
PAREXEL International Corp	PRXL GR	12/2/2008	4/3/2008	Adjustment

	Equity			Factor: 2
SEB SA	GRB GR Equity	14/2/2008	16/6/2008	Adjustment Factor: 3
Tethys Oil AB	TZB GR Equity	14/2/2008	3/3/2008	Adjustment Factor: 3
BASF SE	BAS GR Equity	21/2/2008	27/6/2008	Adjustment Factor: 2
MTI Ltd	MBO GR Equity	21/2/2008	26/3/2008	Adjustment Factor: 2
NIC Corp	NIZ GR Equity	21/2/2008	26/3/2008	Adjustment Factor: 2
Cairo Communication SpA	CI1 GR Equity	21/2/2008	25/2/2008	Adjustment Factor: 10
Suncor Energy Inc	SM3 GR Equity	27/2/2008	12/5/2008	Adjustment Factor: 2
Southwestern Energy Co	SW5 GR Equity	28/2/2008	26/3/2008	Adjustment Factor: 2
Unicharm Petcare Corp	UPQ GR Equity	29/2/2008	26/3/2008	Adjustment Factor: 2
Steel Dynamics Inc	SD5 GR Equity	4/3/2008	31/3/2008	Adjustment Factor: 2
Petroleo Brasileiro SA	PJXB GR Equity	5/3/2008	28/4/2008	Adjustment Factor: 2
E.ON SE	EOAN GR Equity	6/3/2008	4/8/2008	Adjustment Factor: 3
Timah Persero Tbk PT	TIH1 GR Equity	11/3/2008	8/8/2008	Adjustment Factor: 10
Cliffs Natural Resources Inc	CVA GR Equity	11/3/2008	16/5/2008	Adjustment Factor: 2
Suryainti Permata Tbk PT	XQO1 GR Equity	11/3/2008	12/3/2008	Adjustment Factor: 4
Samart I-Mobile PCL	TDZ2 GR Equity	13/3/2008	8/5/2008	Adjustment Factor: 10
Union Fenosa SA	UEF2 GR Equity	13/3/2008	14/7/2008	Adjustment Factor: 3
Sociedad Quimica y Minera de Chile SA	QYM GR Equity	17/3/2008	31/3/2008	Adjustment Factor: 10
MCH Group AG	MEF1 GR Equity	18/3/2008	19/5/2008	Adjustment Factor: 10
Chindex International Inc	UC1 GR Equity	19/3/2008	17/4/2008	Adjustment Factor: 1.5
Sulzer AG	SUL1 GR Equity	20/3/2008	14/4/2008	Adjustment Factor: 10
Energiedienst Holding AG	KWK3 GR Equity	20/3/2008	27/6/2008	Adjustment Factor: 10
Bank J Safra Sarasin AG	BKC1 GR Equity	26/3/2008	7/5/2008	Adjustment Factor: 100
Petroleo Brasileiro SA	PJXA GR Equity	26/3/2008	8/5/2008	Adjustment Factor: 2
Petroleo Brasileiro SA	PJX GR Equity	26/3/2008	8/5/2008	Adjustment Factor: 2
Lomiko Metals Inc	DH8B GR Equity	26/3/2008	3/10/2008	Adjustment Factor: 4
Banco Bradesco SA	BREC GR Equity	28/3/2008	16/4/2008	Adjustment Factor: 1.5

Kingdee International Software Group Co Ltd	KDIC GR Equity	1/4/2008	9/5/2008	Adjustment Factor: 4
Truewest Corp	YFLB GR Equity	4/4/2008	7/4/2008	Adjustment Factor: 100
Kuzbassenergo OJSC	KUW GR Equity	4/4/2008	22/4/2008	Adjustment Factor: 2
ElringKlinger AG	ZIL2 GR Equity	9/4/2008	7/7/2008	Adjustment Factor: 3
EVN AG	EVN GR Equity	10/4/2008	17/4/2008	Adjustment Factor: 4
Surgutneftegas OAO	SGN GR Equity	10/4/2008	18/4/2008	Adjustment Factor: 5
Surgutneftegas OAO	SGNV GR Equity	10/4/2008	18/4/2008	Adjustment Factor: 10
Nestle SA	NESR GR Equity	11/4/2008	30/6/2008	Adjustment Factor: 10
Weatherford International Ltd/Switzerland	WH4 GR Equity	21/4/2008	27/5/2008	Adjustment Factor: 2
Atlas Energy Inc	UXR GR Equity	23/4/2008	2/6/2008	Adjustment Factor: 1.5
East Japan Railway Co	EJR GR Equity	28/4/2008	5/1/2009	Adjustment Factor: 100
Piscines Desjoyaux SA	DJX GR Equity	29/4/2008	5/5/2008	Adjustment Factor: 4
GOME Electrical Appliances Holding Ltd	CKS2 GR Equity	29/4/2008	23/5/2008	Adjustment Factor: 4
Life Technologies Corp	IVN GR Equity	30/4/2008	28/5/2008	Adjustment Factor: 2
Bucyrus International Inc	DHG GR Equity	30/4/2008	28/5/2008	Adjustment Factor: 2
China State Construction International Holdings Ltd	C4S1 GR Equity	30/4/2008	13/6/2008	Adjustment Factor: 4
Alstom SA	AOMD GR Equity	7/5/2008	7/7/2008	Adjustment Factor: 2
Fluor Corp	FLU GR Equity	7/5/2008	17/7/2008	Adjustment Factor: 2
Inter Parfums Inc	JF1 GR Equity	7/5/2008	2/6/2008	Adjustment Factor: 1.5
Mechel	MHSA GR Equity	8/5/2008	20/5/2008	Adjustment Factor: 3
Arcadis NV	HIJ2 GR Equity	9/5/2008	16/5/2008	Adjustment Factor: 3
Nippon Telegraph & Telephone Corp	NTT GR Equity	15/5/2008	5/1/2009	Adjustment Factor: 100
Sumitomo Mitsui Financial Group Inc	XMF GR Equity	16/5/2008	5/1/2009	Adjustment Factor: 100
Yanzhou Coal Mining Co Ltd	YZC GR Equity	16/5/2008	7/7/2008	Adjustment Factor: 5
Resona Holdings Inc	DW1 GR Equity	16/5/2008	5/1/2009	Adjustment Factor: 100
Chinese Energy Holdings Ltd	IXSE GR Equity	19/5/2008	27/6/2008	Adjustment Factor: 5
Impress Holdings Inc	IMB GR Equity	20/5/2008	5/1/2009	Adjustment Factor: 100
Metall Zug AG	NDH1 GR	21/5/2008	26/5/2008	Adjustment

	Equity			Factor: 2
Itau Unibanco Holding SA	BVXB GR Equity	22/5/2008	10/6/2008	Adjustment Factor: 1.25
Nippon Paper Group Inc	NUP GR Equity	23/5/2008	5/1/2009	Adjustment Factor: 100
Kakaku.com Inc	KKC GR Equity	27/5/2008	25/6/2008	Adjustment Factor: 2
CGG	CGG1 GR Equity	27/5/2008	3/6/2008	Adjustment Factor: 5
Oberbank AG	OBK3 GR Equity	27/5/2008	23/7/2008	Adjustment Factor: 3
Oberbank AG	OBK GR Equity	27/5/2008	23/7/2008	Adjustment Factor: 3
Polyus Gold OJSC	P6J2 GR Equity	30/5/2008	11/6/2008	Adjustment Factor: 2
Gerdau SA	GDUA GR Equity	30/5/2008	20/6/2008	Adjustment Factor: 2
Parkson Retail Group Ltd	P5IB GR Equity	3/6/2008	7/7/2008	Adjustment Factor: 5
Pyramid Oil Co	P3C GR Equity	9/6/2008	7/7/2008	Adjustment Factor: 1.25
Atwood Oceanics Inc	AWZ GR Equity	11/6/2008	14/7/2008	Adjustment Factor: 2
Titan International Inc	TZ4 GR Equity	11/6/2008	18/8/2008	Adjustment Factor: 1.25
Nestle SA	NESM GR Equity	13/6/2008	3/7/2008	Adjustment Factor: 2.5
Southern Copper Corp	PCU GR Equity	19/6/2008	10/7/2008	Adjustment Factor: 3
Vectron Systems AG	V3S GR Equity	20/6/2008	24/6/2008	Adjustment Factor: 3
Lecico Egypt SAE	L3G GR Equity	24/6/2008	15/7/2008	Adjustment Factor: 2
K+S AG	SDF GR Equity	3/7/2008	21/7/2008	Adjustment Factor: 4
Cia de Minas Buenaventura SAA	MBU GR Equity	7/7/2008	23/7/2008	Adjustment Factor: 2
Art's-Way Manufacturing Co Inc	BQG GR Equity	9/7/2008	31/7/2008	Adjustment Factor: 2
Central Telecommunication Co	T2T GR Equity	10/7/2008	1/8/2008	Adjustment Factor: 4
Dalsvyaz OJSC	0020700D GR Equity	10/7/2008	1/8/2008	Adjustment Factor: 6
North-West Telecom	SQ4 GR Equity	10/7/2008	1/8/2008	Adjustment Factor: 5
Sibirtelecom OJSC	S3T1 GR Equity	10/7/2008	1/8/2008	Adjustment Factor: 4
Computer Modelling Group Ltd	5TJ GR Equity	11/7/2008	30/7/2008	Adjustment Factor: 2
Activision Blizzard Inc	AIY GR Equity	11/7/2008	8/9/2008	Adjustment Factor: 2
Iaso SA	IJ5 GR Equity	11/7/2008	16/7/2008	Adjustment Factor: 1.206
Australia & New Zealand Banking	ANB1 GR	17/7/2008	24/7/2008	Adjustment

Group Ltd	Equity			Factor: 5
Greiffenberger AG	GRF GR Equity	18/7/2008	23/7/2008	Adjustment Factor: 10
Illumina Inc	ILU GR Equity	22/7/2008	23/9/2008	Adjustment Factor: 2
Patriot Coal Corp	3PC GR Equity	24/7/2008	12/8/2008	Adjustment Factor: 2
Perusahaan Gas Negara Persero Tbk PT	PGB1 GR Equity	28/7/2008	4/8/2008	Adjustment Factor: 5
Alexion Pharmaceuticals Inc	AXPM GR Equity	29/7/2008	25/8/2008	Adjustment Factor: 2
Synaptics Inc	SJN GR Equity	31/7/2008	2/9/2008	Adjustment Factor: 1.5
Ebix Inc	EWZ GR Equity	1/8/2008	9/10/2008	Adjustment Factor: 3
EnServe Group Ltd	RWO1 GR Equity	5/8/2008	8/9/2008	Adjustment Factor: 5
Incitec Pivot Ltd	I5P GR Equity	6/8/2008	17/9/2008	Adjustment Factor: 20
CD International Enterprises Inc	CH4A GR Equity	6/8/2008	22/9/2008	Adjustment Factor: 100
Integral Systems Inc/MD	IS3 GR Equity	13/8/2008	8/9/2008	Adjustment Factor: 2
DVB Bank SE	DVB GR Equity	14/8/2008	18/8/2008	Adjustment Factor: 10
China Southern Airlines Co Ltd	ZNH GR Equity	25/8/2008	23/9/2008	Adjustment Factor: 1.5
Euroz Ltd	E7L1 GR Equity	1/9/2008	9/10/2008	Adjustment Factor: 2
DXP Enterprises Inc	DX7 GR Equity	8/9/2008	1/10/2008	Adjustment Factor: 2
RAM Active Media PLC	RM3A GR Equity	8/9/2008	30/9/2008	Adjustment Factor: 2000
Buckle Inc/The	BK2 GR Equity	15/9/2008	31/10/2008	Adjustment Factor: 1.5
UBISOFT Entertainment	UEN GR Equity	22/9/2008	14/11/2008	Adjustment Factor: 2
Dentsu Inc	DEN GR Equity	25/9/2008	5/1/2009	Adjustment Factor: 100
Parallel Media Group PLC	PTV2 GR Equity	29/9/2008	27/10/2008	Adjustment Factor: 4000
Colorado Goldfields Inc	G1W2 GR Equity	17/10/2008	28/11/2008	Adjustment Factor: 1.3
Round One Corp	RDN GR Equity	23/10/2008	5/1/2009	Adjustment Factor: 100
Village Super Market Inc	VSU GR Equity	5/12/2008	23/1/2009	Adjustment Factor: 2
General Maritime Corp	G02 GR Equity	5/12/2008	17/12/2008	Adjustment Factor: 1.34
Fountain Healthy Aging Inc	U7IB GR Equity	17/12/2008	23/12/2008	Adjustment Factor: 2
Capital Resource Alliance Inc	0CR GR Equity	17/12/2008	18/12/2008	Adjustment Factor: 3
Morphosys AG	MOR GR Equity	22/12/2008	23/12/2008	Adjustment Factor: 3

Roche Holding AG	RHO6 GR Equity	23/12/2008	9/1/2009	Adjustment Factor: 2
Life Partners Holdings Inc	LPQ GR Equity	6/1/2009	18/2/2009	Adjustment Factor: 1.25
Keyence Corp	KEE GR Equity	30/1/2009	16/3/2009	Adjustment Factor: 1.1
Nichii Gakkan Co	NG4 GR Equity	10/2/2009	26/3/2009	Adjustment Factor: 2
Myriad Genetics Inc	MYD GR Equity	24/2/2009	26/3/2009	Adjustment Factor: 2
Societe des Bains de Mer et du Cercle des Etrangers a Monaco	RJ8 GR Equity	10/3/2009	12/3/2009	Adjustment Factor: 10
Schweizerische National-Versicherungs-Gesellschaft AG	FB9 GR Equity	1/4/2009	26/5/2009	Adjustment Factor: 20
Cia Energetica de Minas Gerais	CID GR Equity	20/4/2009	14/5/2009	Adjustment Factor: 1.25
Orascom Construction Industries	ORK GR Equity	30/4/2009	7/5/2009	Adjustment Factor: 2
BKS Bank AG	ZUE GR Equity	5/5/2009	5/6/2009	Adjustment Factor: 6
BKS Bank AG	BK5 GR Equity	5/5/2009	5/6/2009	Adjustment Factor: 6
Bank fuer Tirol & Vorarlberg AG	ZTY GR Equity	6/5/2009	10/6/2009	Adjustment Factor: 5
Bank fuer Tirol & Vorarlberg AG	ZUD GR Equity	6/5/2009	10/6/2009	Adjustment Factor: 5
AmerisourceBergen Corp	ABG GR Equity	19/5/2009	16/6/2009	Adjustment Factor: 2
Green Mountain Coffee Roasters Inc	GM2 GR Equity	19/5/2009	9/6/2009	Adjustment Factor: 1.5
Water Intelligence PLC	PHRC GR Equity	19/5/2009	11/6/2009	Adjustment Factor: 10
Ad Pepper Media International NV	APM GR Equity	25/5/2009	27/5/2009	Adjustment Factor: 2
Desert Gold Ventures Inc	QXR1 GR Equity	5/6/2009	8/6/2009	Adjustment Factor: 400
Prime People PLC	RCJ2 GR Equity	9/6/2009	8/7/2009	Adjustment Factor: 500
Delticom AG	DEX GR Equity	16/6/2009	22/6/2009	Adjustment Factor: 3
American Physicians Capital Inc	8243101Q GR Equity	23/6/2009	3/8/2009	Adjustment Factor: 1.33333
Marenave Schiffahrts AG	M5S GR Equity	7/7/2009	16/7/2009	Adjustment Factor: 10
NPC Inc/Japan	59N GR Equity	30/7/2009	26/8/2009	Adjustment Factor: 2
TagLikeMe Corp	M6C1 GR Equity	31/7/2009	3/8/2009	Adjustment Factor: 2
General Metals Corp	GMQ2 GR Equity	3/8/2009	4/1/2011	Adjustment Factor: 1.1
Park Place Energy Corp	3P2N GR Equity	5/8/2009	3/9/2009	Adjustment Factor: 10
Cross Border Resources Inc	0DE2 GR Equity	18/8/2009	14/9/2009	Adjustment Factor: 5

A.G.BARR PLC	AF71 GR Equity	26/8/2009	21/9/2009	Adjustment Factor: 2
United Therapeutics Corp	UTH GR Equity	1/9/2009	23/9/2009	Adjustment Factor: 2
China Eco-Farming Ltd	LFN1 GR Equity	2/9/2009	13/10/2009	Adjustment Factor: 10
Erlus AG	DZE GR Equity	24/9/2009	5/10/2009	Adjustment Factor: 10
CVM Minerals Ltd	CWU2 GR Equity	24/9/2009	19/10/2009	Adjustment Factor: 4
Koss Corp	KO1 GR Equity	25/9/2009	2/12/2009	Adjustment Factor: 2
Gold Hill Resources Inc	GATN GR Equity	29/9/2009	29/1/2010	Adjustment Factor: 1.75
Southern Cross Resource Group Inc/PA	6SH GR Equity	1/10/2009	5/10/2009	Adjustment Factor: 5
San West Inc	HB2N GR Equity	12/10/2009	3/11/2009	Adjustment Factor: 5
Sino Dragon New Energy Holdings Ltd	ZIJB GR Equity	13/10/2009	9/11/2009	Adjustment Factor: 20
Ruifeng Petroleum Chemical Holdings Ltd	T1H3 GR Equity	14/10/2009	5/11/2009	Adjustment Factor: 5
Insight Management Corp	746N GR Equity	20/10/2009	10/11/2009	Adjustment Factor: 7
Jipangu Inc	PMK GR Equity	28/10/2009	28/12/2009	Adjustment Factor: 2
Wimm-Bill-Dann Foods OJSC	WBPA GR Equity	30/10/2009	17/11/2009	Adjustment Factor: 4
Berkshire Hathaway Inc	BRYN GR Equity	3/11/2009	21/1/2010	Adjustment Factor: 50
Computech Holdings Ltd	XOPE GR Equity	4/11/2009	4/12/2009	Adjustment Factor: 5
Mei Ah Entertainment Group Ltd	MFK1 GR Equity	5/11/2009	22/12/2009	Adjustment Factor: 5
Neogen Corp	NG2 GR Equity	16/11/2009	16/12/2009	Adjustment Factor: 1.5
Universal Health Services Inc	UHS GR Equity	18/11/2009	16/12/2009	Adjustment Factor: 2
Universal Health Services Inc	UHS1 GR Equity	18/11/2009	16/12/2009	Adjustment Factor: 2
Lee & Man Paper Manufacturing Ltd	LMP GR Equity	30/11/2009	21/12/2009	Adjustment Factor: 4
Hong Kong Building & Loan Agency Ltd/The	HK8A GR Equity	2/12/2009	11/2/2010	Adjustment Factor: 10
Intek Group SpA	IKG1 GR Equity	3/12/2009	8/2/2010	Adjustment Factor: 1.5
Cairn Energy PLC	FKGC GR Equity	4/12/2009	22/12/2009	Adjustment Factor: 10
NZX Ltd	5NZ GR Equity	7/12/2009	22/12/2009	Adjustment Factor: 4
Kazakhtelecom JSC	KZTA GR Equity	7/12/2009	16/12/2009	Adjustment Factor: 5
Meyer Burger Technology AG	M6YA GR Equity	10/12/2009	18/1/2010	Adjustment Factor: 10
Balchem Corp	BL9B GR	11/12/2009	21/1/2010	Adjustment

	Equity			Factor: 1.5
Japan Retail Fund Investment Corp	59JA GR Equity	15/12/2009	24/2/2010	Adjustment Factor: 4
iOne Holdings Ltd	IH2A GR Equity	16/12/2009	12/1/2010	Adjustment Factor: 40
Quantitative Alpha Trading Inc	8RT GR Equity	17/12/2009	21/12/2009	Adjustment Factor: 5
Northwest Bancshares Inc	NHS GR Equity	17/12/2009	18/12/2009	Adjustment Factor: 2.25
China Agritech Inc	4CN1 GR Equity	17/12/2009	8/2/2010	Adjustment Factor: 2
Trina Solar Ltd	TR3 GR Equity	30/12/2009	20/1/2010	Adjustment Factor: 2

List of References

Bley, J. (2002). Stock Splits and stock return behaviour: how Germany tries to improve the attractiveness of its stock market. *Applied Financial Economics, Vol.12, Issue 2*, 85-93.

Byun, J., & Rozeff, M. S. (2003). Long-run Performance after Stock Splits: 1927 to 1996. *The Journal of Finance, Vol. 58, Issue 3*, 1063–1086.

Dennis, P. (2003). The Case of the Nasdaq-100 Index Tracking Stock. *The Financial Review, Vol. 38, Issue 3*, 415-433.

Dhar, S., & Chhaochharia, S. (2009). Market Reaction Around the Stock Splits and Bonus Issues: Some Indian Evidence. *Asia Pacific Business Review, Vol. 5, No. 3* , 56-62.

Kunz, R. M., & Rosa-Majhensek, S. (2008). Stock Splits in Switzerland: To Signal or Not to Signal? *Financial Management, Vol. 37, Issue 2*, 193-226.

Lakonishok, J., & Lev, B. (1987). Stock Splits and Stock Dividends: Why, Who, and When. *The Journal of Finance, Vol. 42, No. 4*, 913-932.

Leledakis, G., Papaioannou, G. J., Travlos, N. G., & Tsangarakis, N. V. (2009). Stock Splits in a Neutral Transaction Cost Environment: Evidence from the Athens Stock Exchange. *Journal of Multinational Financial Management, Vol. 19, No. 1*, 12-25.

McNichols, M., & Dravid, A. (1990). Stock Dividends, Stock Splits, and Signaling. *The Journal of Finance, Vol. 45, Issue 3*, 857–879.

Mishra, A. K. (2007). The Market Reaction to Stock Splits - Evidence from India. *International Journal of Theoretical and Applied Finance (IJTAF), Vol. 10, Issue 02*, 251-271.

Wulff, C. (2002). The Market Reaction to Stock Splits - Evidence from Germany. *Schmalenbach Business Review, Vol. 54*, 270 – 297.

Yagüe, J., Gómez-Sala, J. C., & Poveda-Fuentes, F. (2009). Evidence from the Spanish market. *Global Finance Journal, Vol. 20, Issue 1*, 31-47.